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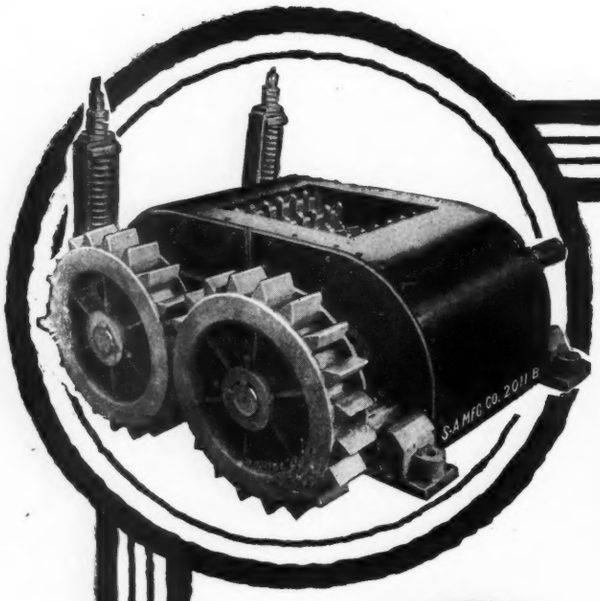

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MEXICAN WOMEN SORTING ORE

Mining in Mexico Today

BY AN AMERICAN ENGINEER

The writer of the following notes is an American mining engineer who is exceptionally well qualified to speak of present conditions in Mexico, with particular reference to the mining industry. It is well known that banditry is, happily, rare in a few parts of the country. Over the greater area, however, the conditions described by our contributor are proving a serious detriment to industrial and social progress. Moreover, such conditions, if allowed to continue unchecked, must inevitably lead to a state of indescribable chaos. Grave danger will result, not only to Mexico as a nation, but also to the people of those countries which are morally bound to do something more than watch the rapid disintegration of the country and the demoralization of its industries.

SO LITTLE has recently appeared in the daily press regarding Mexico that many have been led to believe that conditions in that country have become normal. If this is so, then those prevailing under the Diaz regime were abnormal, and were due entirely to his strong personality. Everyone is looking forward hopefully to the resumption of business, especially mining, but it is becoming increasingly evident that this is impossible until a radical change takes place.

I have spent the greater part of the last 10 years in Mexico, and until recently operated an important mining property, directed by United States interests,

only a few miles from one of the principal cities in one of the central states. Work was carried on by brute force; and but for the fortunate opening of an exceptionally rich oreshoot, operations would have resulted in financial disaster. The property could not have been operated with the average grade of ore of former times, even with silver selling at a dollar an ounce.

Although comparatively close to one of the large cities, we were ever threatened, and twice during the year we were attacked. Our hacienda resembled a fort, surrounded by a 10-ft. wall, with shooting towers at the corners and at least 20 men always on guard, day and night. And such precautions as these were needed within one of the districts said to be "'normal"! For guards we employed ranchers of the old school—men who had lost their all, and were as anxious as we were to end the existence of the bandits.

Inefficiency of Federal Troops

Only half-hearted attempts were ever made by the federal troops to suppress banditry, although a good-sized garrison was close at hand. I know that 30 head of cattle were sent to the "general" in charge of the federal troops within our state last spring, in consideration for which a burro train of ammunition was dispatched to the bandits. Within a few weeks these very same bandits attacked our camp, and, no doubt, used against us the ammunition furnished by the federal "general."

Even Mexico City is not exempt from the activities of those who live by looting. This last summer a detail of federal troops looted one of the suburbs. Frantic appeals were made over the telephone, and in the afternoon a second detail was dispatched to arrest the first. Both returned to headquarters loaded down with loot; and to judge from the expressions on the faces of the first men, it was evident they were not expecting severe punishment.

I never heard of any loot being returned. The opinion was expressed at the time by a federal employee: "What can you expect? The troops have not been paid for months. They have to live."

During a threatening period at our mine, I once made the mistake of appealing for help to the governor, who sent out an insipid-looking "captain" with a detail of 15 men and a letter stating that the "captain" would take charge of our "escolta" for five pesos per day. We could pay the soldiers if we so desired. Within a few hours after its arrival the detail had looted a part of our town, even to the women's clothing, and had robbed a freighter of several hundred pesos' worth of corn. The loot was then sold to the peons for a song, and the proceeds were invested in drink. The men amused themselves by taking "pot shots" at animals and stray peons on the hillsides, but, fortunately, no one was hit. We had a week of sleepless nights before it was possible to have the detail recalled. We never again asked the governor for help.

Federal Troops Kill Innocent Mexicans

Occasionally the federal troops made a trip out in the mountains, advertising the project well in advance so that there would be no possibility of meeting the "enemy." Devil help any poor peon caught by the federals when so occupied! Last spring, during such a trip, about 18 charcoal burners were caught, killed, and strung up as an object lesson for bandits. I knew four of these poor devils personally, and am convinced that all were innocent victims, killed to make a "showing." We were dependent on charcoal for all mine blacksmithing and for use in our local foundry. The killing so frightened the burners who survived that we were unable to obtain charcoal for several weeks. We actually lost several days' work as a direct result of this killing, for we were in urgent need of some castings, and this work could not be carried out until we had found a small supply of charcoal in another district.

In northern Mexico an effective "home guard" is now in existence that has done wonders in cleaning up the bandits in that section. An armed guard of this type is dangerous, however, and needs to be handled with gloves. The minute it feels its strength it may prove a boomerang to those who are looking for protection. Or it might overestimate its strength, get into trouble with the authorities, and be driven out.

Difficulties in Obtaining Cash in Many Districts

Mexico is now on a straight gold-silver basis. To get the actual coin to meet local expenses was a great worry, and fully a third of my personal time was spent thus. The nearest bank was over 200 miles away, and we depended entirely on selling drafts locally. Under this system a merchant may be given a draft today for several thousand pesos, and one has to wait a week or so for the cash, during which time it is necessary to finance several merchants and corn dealers, and to trust to luck that they don't leave. It is possible to ship money by express from Mexico City, insuring with Lloyds for a little over 1% against loss. This company, however, will not ship if there is the slightest danger of a hold-up, and so the service cannot be depended upon. In desperation we were, on several occasions, forced to send an agent to Mexico City, and he would bring back several thousand pesos in a valise—a risky procedure. As an alternative plan, money was deposited with the treasurer of the Constitutional R.R. at Mexico City, and advanced to us by their local agent. This worked out satisfactorily, except that no dependence could be placed on the amounts likely to be available over any period. It also took the local agent about a week to hear of the deposit. We required about 8000 pesos per week for local needs, and it was necessary to keep at least a three-weeks' supply on hand.

How Supplies Are Obtained in the Camps

Regular freight service can hardly be said to exist. The large companies and smelters operate their own trains under special arrangements with the Constitutional R.R. The smaller concerns were dependent on "trading" companies, which operate special chartered trains from the border to the important centers within the country at definite intervals. On the whole, the service was quite satisfactory. The extra charge is from 60 to 75% of the regular freight. One of the largest "trading" companies is operated by José María Pescador, brother of the general manager of the railroads. To appreciate this situation in the United States, one need only to imagine a special train service (and the only service available) run by Mr. McAdoo's brother, for which you had to pay 160% of the regular rate.

Our product was shipped to the smelter in the lat-

ter's own equipment, as per contract. No extra charge was made for this service by the smelter.

To obtain cars for their exclusive use the various large companies and smelters have contracted to rehabilitate the partly destroyed rolling stock. The terms of exclusive service depend on the condition of the cars before rebuilding. In general, the exclusive use of a car is obtained for one year, and that of a locomotive for a term of two years. It often costs as much as 10,000 pesos to repair one engine. The system is fairly effective and is aiding greatly in the rehabilitation of the railroads.

Condition of the Railroads

The main line of the old National R.R. from Laredo, Texas, to Mexico City is in fair condition, and trains are operating without interruption, as well as on the Central R.R. from Mexico City to Torreon. Practically no other line is safe. Trains from Vera Cruz to the city are attacked frequently; also those from El Paso to Torreon. One dare not leave the railroad or a big city without an armed force.

Labor costs today little more than formerly in the matter of dollars and cents paid per man. In actual practice, however, labor costs have increased fully 50%, and this is due to the decrease in the efficiency of the men, who have lived so long without working that there is little desire to return. Another big factor has been the emigration of the better men to the United States. This refers especially to mechanics, carpenters, and the better class of miners. Fortunately our camp was not troubled by demands by the men for three months' pay when they were discharged. This custom is obligatory in some states, and if not adopted with care will break up the morale of any organization and force the mine to close.

No great difficulty was encountered in obtaining supplies, except as a result of delays occurring during 1918 in connection with mining requirements shipped from the United States. It was next to impossible to buy special equipment in Mexico City, and one cannot obtain miscellaneous supplies from the city at any reasonable figure, and so material is bought there only in an emergency. An article purchased there will involve an expenditure of 150% of the cost of the same article bought and imported from the United States. There are few exceptions to this. The Mexico City houses are making a great mistake. They plead the high cost of doing business and few sales; but the greater part deserve none. They should realize that their only hope is to reduce prices and increase sales. Failing this, there is an opportunity for a large hardware house to go into Mexico and take over the business previously carried on by the Germans. Action should be taken at once or the opportunity will be lost.

The Small Rancher Now Non-Existent

Thousands of Mexicans would have starved last year had not the United States allowed corn to be exported into Mexico. All the large companies and communities imported corn and sold it at cost to the people. A good crop was obtained in 1918, but only the large valleys were cultivated. There are no signs of the thousands of small corn patches up in the canyons and on the hillsides, as of old. The farmer dares not take his oxen out in the hills, because, if he were to do so, a bandit would, in all probability, swoop down within an hour and drive off the animals. Should he gather his corn by hand, it would only be stolen at harvest. Consequently, the small rancher no longer exists. Meat is still cheap, for it is practically all obtained from stolen cattle. Livestock, however, is fast disappearing, and soon it will all be gone.

In conclusion I would add that there is no one man capable of controlling the entire country. Carranza, no doubt, will hereafter heed us a little more than formerly, but his authority extends only to the centers of the large cities. The other chieftains have little idea of the difference between Americans and Germans. The truth of the matter is that self-determination, as we understand the term today, is a farcical idea and impracticable of application to the conditions prevailing in Mexico. The present state of affairs will continue until some one, and it could properly be the United States, goes down there and puts the country in order. There is no other alternative.

New Chromium Deposits in Rhodesia

Over a year ago a deposit of high-grade chrome ore was discovered in the Umvukwes Range, in Rhodesia, according to *Commerce Reports*. A systematic survey has already proved the existence of 2,000,000 tons of ore, and further large quantities are expected. The ore occurs in an area of 4500 acres. An average test of 300 samples shows 53% chromic acid. Besides the massive ore there is an alluvial deposit covering 1500 acres, which yields a mineral that assays 48% chromic acid. Provided a branch line be constructed to connect the mines with the main line at Banket Junction (a distance of 30 miles), it is estimated that the cost of ore delivered at Beira will be less than 35s. per ton.

Negligently Arranging Machinery

By A. L. H. Street*

The suit of Sharp *vs.* Athletic Mining and Smelting Co. (*205 Southwestern Reporter, 695*), recently before the Arkansas Supreme Court, involved the liability of the defendant for injury to an employee in its smelting plant. He sued for damages for personal injury claimed to have been sustained through negligence of the defendant company in constructing a track and bull wheel in such close proximity to a supporting form for a pier of an ore drier, at which plaintiff was working, as to make his work hazardous. He also asserted negligence in starting a rabble rake without notice or warning to him while he was imperiled thereby.

Granting the employing company a new trial after verdict in favor of plaintiff, it is held by the Supreme Court that the trial judge erred in instructing the jury as to the law of the case. It is decided that, notwithstanding any negligence on the part of the employer, the plaintiff must be held to have assumed the risk of being caught by the wing of the rabble rake and injured, if he knew the character of his surroundings and voluntarily remained at work.

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Mining in Utah in 1918

By EDWARD R. ZALINSKI*

THE year 1918 can hardly be said to have been an entirely successful one for the mining industry of Utah. Labor was scarce and inefficient. The influenza epidemic struck a number of the camps in October and November, and increased wages, higher freight rates and smelter schedules, and added cost of supplies made general operating conditions abnormally high. However, it is doubtful if Utah suffered any more than surrounding states or other mining communities. There were some bright spots, namely silver, throughout the year, and copper, up to the end of the year. Lead was also fair during the first half or three-quarters of 1918.

Production for the first six months was good, though less than for the same period of the banner year, 1917. After that, however, output decreased. The new freight rates, which went into effect on June 25, increased wages and smelting rates, and higher operating costs began to curtail operations and cut off lower-grade shipments. Relatively little new construction was undertaken, and little extensive development attempted beyond that consistent with good mining. Despite various drawbacks, preliminary estimates indicate that tonnage of ore and value of output in 1918 were equal to or above the figures of a normal year, though, of course, less than in 1917, when all records were broken. Nineteen Utah mines paid dividends in 1918, amounting to $19,236,189, up to Dec. 23, as compared with $29,410,169, in 1917, and $24,790,140, in 1916. There were two new dividend payers—the Western-Utah Copper Co., in Deep Creek, and the Columbus Rexall company, at Alta.

Ore Market Conditions Good

The ore markets were good, with no refusal or embargoes on the part of smelters. Production of lead-silver ores was satisfactory in the early part of the year, continuing at almost the pace set in 1917, though modified by winter hauling conditions. Heavier shipments were made in the spring from accumulated winter stockpiles, including ores from smaller producers. Shipments were good up to June 25, when the increase in freight rates went into effect. Copper ores were also shipped, but, after June, mostly by the larger producers. Shipments continued through summer and autumn at a progressively decreasing rate, and the output of lead ores decreased during the latter months, except where the lead was carried by ores running well in silver. In general, there was a decrease in the amount of dump ores and low-grade ores, and of shipments by small producers and lessees. The lead market was not as favorable for the miner as in normal times with normal costs, and the same conditions may be said to have applied to copper and most other ores.

Smelting rates were advanced several times through 1918, on account of increased wages and cost of coke and other supplies, though there was no scarcity of coke. There was a decrease in leasing as compared with times when labor is not in great demand, for when labor and costs of supplies are high, many lessees find it more profitable to work for wages.

*Mining engineer, Salt Lake City, Utah.

The increase in freight rates, as stated, went into effect on June 25, all class and commodity rates being advanced 25%, with a heavy flat increase on base bullion. The increases per ton on ores shipped to the Salt Lake Valley smelteries ranged from 10c. to $3.03 on ores up to $300. The new schedule applied a 30-c. flat increase per ton on iron ores shipped to smelteries for fluxing purposes. The highest increase on ores from within the state was from the Deep Creek section, on which the rate was raised $2.125 per ton on $40 ore, with corresponding raises on ores of lesser value. The increase on bullion from smelteries to the East was $6.50 per ton, an advance of 65%, making a freight rate of $16.50 per ton on base bullion. This increase was passed along to the producer, as the smelters made additional deductions from New York metal quotations to offset it.

Wage increases of 25c. and of 50c. per shift were made at Park City and Tintic on Apr. 1, and again later in the year, so that the prevailing wages were the same as at Bingham in practically all the camps, the scale being: Muckers, $4.75; hand miners, $5; machine men, $5.25; machine helpers, $5; timber men, $5.25; trammers, $4.75; and laborers, $4. Wages at Alta were increased on Aug. 1. Wages were also advanced at smelteries and mills. A semi-monthly pay day was adopted in some camps. The prevailing scale for common labor in mills and smelteries in October was: Arthur and Magma, $4.25 per day; Garfield, $3.65; Murray and Midvale, $3.55.

During the first six months of 1918, mining, development, and operating costs increased 33 to 50% and, in some cases, as high as 65%. These increased costs are reflected directly in the dividends.

Tax Legislation Aroused Opposition

The Utah Legislature at its last session passed resolutions proposing an amendment to Section 4, Article 13, of the state constitution, relating to the taxation of mines and mining properties. This amendment gave the State Board of Equalization, an appointive body, power to tax mines at some multiple or submultiple of their net proceeds, plus an occupation tax. This question was voted on at the general election in November, and the amendment was adopted by a majority of 13,901 votes out of 56,773 votes cast. The measure was carried by the organized efforts of the governor and his staff, state officers, the school boards, and teachers. It was naturally voted against in the mining counties of the state, but was favored by the agricultural interests. The 3% net-proceeds tax became delinquent Nov. 30, and payment was refused by nearly all of the 486 mining companies in the state. The mine occupation and privilege tax of $1 was not opposed. The net-proceeds tax was operative in 1918 for the first time, as it became a law too late to apply to 1917 taxes. The total amount assessed under the 3% tax was $989,341. The sale of mining properties for delinquent taxes was scheduled for the third Monday in December by the State Treasurer, who, however, was enjoined by the mining companies, who brought suit to test the constitutionality of the act.

The various camps, Bingham, Tintic, Park City, Alta, and the Cottonwoods, produced steadily except as affected by the influenza epidemic and the other conditions mentioned. There was a smaller output from Deep Creek, American Fork, Ophir, Stockton, Beaver County, and Dugway, approximately in the order named. Silver, lead, and copper ores were shipped.

Park City

Conditions at Park City, as elsewhere, were generally unsatisfactory. The district was seriously handicapped by labor shortage. Wages were increased two or three times to the scale prevailing at Bingham and other camps. The labor was also inefficient, and miners worked less steadily than usual, laying off at frequent intervals. Most of the mines worked only one shift, owing to lack of men. Some drawback was experienced on account of influenza, the camp being quarantined twice. This also affected the labor supply, as many miners left to avoid the quarantine. No trouble was experienced on account of lack of fuel, but from time to time there was a moderate shortage of railroad cars. Cars were often furnished in poor condition for handling fine ores and concentrates. Early in the year, the Union Pacific was forbidden to handle ore. In general, there were few new installations, all properties curtailing construction work, and there were also relatively less extensive prospecting and development.

Though the output of Park City was less than that of 1917, a fair tonnage was shipped, estimated at approximately four-fifths of the 1917 output, when 100,000 tons was shipped. The most prominent producers were the Silver King Coalition, Judge Mining and Smelting, Ontario, Daly West, Silver King Consolidated, and Daly. The Ontario developed a good oreshoot on the main vein between the 1500 and 1700 levels, and shipped a large tonnage of dry siliceous silver ore, and paid dividends. A change took place in the management of the Daly West on Feb. 22, and under the new regime an extensive campaign of development was laid out, operations on which were to start about January, 1919. Connections were made between the Judge transportation tunnel and the main working shaft of the Daly West at the 750 level—a new level here—and ore pockets, a self-dumping skip, and other necessary equipment were installed. Everything above the 1550 level at the Daly West was operated by lessees.

Judge Zinc Plant Enlarged

The Judge Mining and Smelting Co. did some new development work in the southwestern part of the property under Bonanza Flat, and opened good ore there and in other parts of the mine. At the company's zinc plant, changes and additions were made, preparatory to starting the second unit about Jan. 1, 1919. The first section operated throughout 1918 and produced premium spelter exclusively, the product assaying 99.9% zinc or above in purity. With two units working, this plant will handle about 50 tons of zinc concentrates daily, as compared to a former production of 30 tons. By treating 45 tons of concentrates, the output will be around 15 tons of spelter daily, according to the grade of ore. The tonnage of silver, lead, and zinc ore mined by the Judge was approximately the same as in 1917.

The Park-Utah, a newly incorporated company, operated from the main Ontario drain tunnel and crosscut several mineralized fissures in the quartzite not far from the famous old Ontario vein. The Silver King Coalition operated mine and mill as usual, but with reduced forces, and produced a fair tonnage of high-grade silver-lead ores. The accounting in the case with the Conkling Mining Co. came up in 1918, there being a judgment of between $400,000 and $500,000 against the Coalition, as at present figured, though the matter was not finally settled. Thomas Kearns and David Keith, two of the chief owners of the Coalition, died during the year, and W. W. Armstrong, of Salt Lake City, was elected president. Toward the end of the year an examination of the company's property was being made, and it was said that detailed conditions would be reported to stockholders, although there were also rumors that an option had been given on the property.

The Three Kings operated and prospected from a winze below its lowest or 550 level, by cross-cutting southeasterly in the limestone toward the contact of the underlying Ontario quartzite. Several fissures mineralized with silver and lead were opened. The main ore-bearing horizon of the Silver King Coalition, adjoining, and of other properties—the 200 ft. of limestone overlying the quartzite—was not reached. The Nail Driver was operated under lease, and made shipments. The Silver King Consolidated advanced its new 14,000-ft. drain and operating tunnel, started in 1917, to beyond the 8000-ft. point, and completed a 150-ton flotation mill in Thayne's Canyon for silver-lead and zinc ores. The orebodies at the old shaft were exhausted, and operations there, high up on the hill, were discontinued and transferred to the California-Comstock section in Thayne's Canyon. The lead and zinc milling ores were obtained from this section of the property.

Alta, Cottonwood, American Fork and Ophir

The production from Alta, including that of the Cardiff mine, is estimated at approximately 30,000 tons in 1918. The largest shippers were the Michigan-Utah, South Hecla, Emma Copper, Sells, Alta Consolidated, Wasatch Mines, Columbus-Rexall, and Cardiff, the latter property being over the divide in Big Cottonwood. About 250 miners were employed in the camp, including those at the Cardiff. The output of this section was principally silver and lead ore, and copper-silver ore. There was some increase in tonnage over 1917, there being no appreciable curtailment on account of the war, though the camp was hampered seriously by labor shortage. This started about July 1, and was acute in September and October. Wages were increased to $4.50 for outside men, $4.75 for muckers, $5 for miners, and $5.25 for machine men, the same scale in force at Bingham and Tintic. The Little Cottonwood Transportation Co. completed and put in operation an eight-mile 36-in. gage railroad from Wasatch, at the eastern terminal of the Salt Lake & Alta R.R., to the camp. This road has a capacity of 150 to 200 tons of ore per day. The South Hecla opened a new sulphide orebody, 25 ft. thick, carrying copper and silver, and shipped extensively from this deposit, as well as from the older lead-carbonate stopes in another part of the mine.

Shipments were made by the Michigan Utah, and the Triangle Lease yielded a good output of silver-lead

ores. The latter also shipped 40% manganese ore, and some copper. The Columbus-Rexall produced a fair tonnage of sulphide copper-silver ore and became a dividend payer. The Wasatch Mines extended its drain and operating tunnel to 3300 ft. The total length is to be 5000 ft., to connect with the old Columbus-Consolidated main workings. This tunnel should be completed by spring. Silver-lead ore was opened in the Braine fissure near the old-time productive ground. The Alta Consolidated opened a new silver-lead orebody and shipped. The Cardiff shipped extensively and developed a new orebody, eight feet and upward in thickness, in the main tunnel beyond the original oreshoot. The Sells mine built and put in operation a 2000-ft. 100-ton tramway, and shipped silver-lead.

In American Fork, the Pacific mine, under lease to the Fissures Exploration Co., produced silver-lead concentrates at its 150-ton mill, and shipped some ore direct. The Miller Hill shipped silver-lead ore. At the Bellerophon, a small mill was put in by the American Fork Exploration Co., lessees. A moderate amount of ore was shipped by the latter and from the Bay State. Altogether the output from American Fork was small. At Ophir, in Tooele County, the principal producer was the Ophir Hill Consolidated, which shipped silver-lead ores and a few cars of manganese ore running 44 to 45%. Lessees operating on Lion Hill, at the Lion Hill Consolidated and Buffalo, shipped a few cars of siliceous silver ore.

Activities in Beaver and Tooele Counties

In Beaver County, the Red Warrior shipped silver-lead ore. The Moscow shipped a few cars of zinc ore which had been stored, and one or two cars of lead ore. The Commonwealth was operated under lease, and shipped a small amount of copper. The Wild Bill produced 18 or 20 cars of good silver-lead ore by lessees. The Milford Copper, formerly the Montreal, shipped from low-grade copper deposits, the ore carrying considerable magnetic iron. The Majestic Mines Co. made shipments from its Old Hickory mine adjoining the Milford Copper. The Horn Silver, at Frisco, shipped lead ores to the U. S. Smelting Co. The dump at this company's old mill was treated by the Caldo Mining Co.'s flotation plant, which produced zinc and lead concentrates. At Newhouse, the flotation mill of the Utah Leasing Co. treated copper tailings from the old South Utah dump, and paid dividends.

At Stockton, in Tooele County, the Bullion Coalition mine was operated chiefly by lessees, who shipped lead ore. A small amount of lead ore was shipped from Dry Canyon, and also zinc ore from the same section by D. W. Lynch. At Deep Creek, in Tooele County, the Western Utah Copper shipped copper and also lead ores, and paid its first dividend. This company began work on a 100-ton mill. The Monocco mine, near Clifton, in the Deep Creek section, shipped 20 cars or more of good copper ore; and the Southern Confederate, near Clifton, shipped a high-grade silver-lead ore. Small shipments of tungsten and bismuth ore were made by Wilson Bros. from Bold Hill. Among other properties operating in this section were the Western Utah Extension, Pole Star Copper, and Seminole Copper. The Deep Creek R.R. handled ore and freight between Gold Hill or Goodwin and the Western Pacific R.R. at Wendover.

The Utah mine, at Fish Springs, about 30 miles southeast of Deep Creek, built and nearly completed a 100-ton mill for treatment of silver-lead ores. This mine paid dividends for a number of years, but was handicapped by the hard 80-mile haul to the railroad at Oasis. There are extensive dumps of low and of medium grade.

The Dugway district, about 15 miles east of Fish Springs, produced a few cars of copper ore; also lead ore. A car of fluorite was shipped from Granite Mountain, six miles north of Dugway. With better transportation, this section should develop. The nearest railroad point at present is Faust, 55 miles distant, on the San Pedro, Los Angeles & Salt Lake Railroad.

Fluxing iron ore carrying a little copper was shipped from the Salt Lake Copper Co.'s property by Tibby & Howell, lessees. The mine is in the western part of Boxelder County near the Nevada state line, the shipping point being Tunnel Station, near Tecoma, Nev. Approximately 3000 tons, carrying 0.5% copper and 45% excess iron, was shipped.

Tintic District

Production in the Tintic district was fair in the first six months of 1918. There was no serious car shortage. No figures are at present available relating to shipments, but they are roughly estimated at about 80% of the total in 1917, or approximately at 325,000 tons. The mines produced under difficulties, the influenza being so severe that the camp was quarantined for practically the last three months of the year. Labor was also scarce and inefficient. Good shipments of silver-lead ore, some copper, and straight siliceous silver ore were made. Among the properties operating were the Iron Blossom, Chief, Gemini, Ridge & Valley, Eagle & Blue Bell, Victoria, Mammoth, and May Day, all of which shipped lead-silver ores. The Centennial Eureka shipped copper-silver ores; the Dragon Consolidated iron ore during the first 10 months, also shipping silver-lead ore. Part of the Dragon workings was leased to the Tintic Milling Co., which mined and treated the lower-grade silver-lead ores at its mill at Silver City, and produced bullion. The Empire Mines Co., a consolidation of the Black Jack, Lower Mammoth, and other properties, by the Knight interests, shipped a little iron ore and occasional cars of silver-lead. Copper ore was shipped by the Grand Central and Iron Blossom.

The Tintic Standard continued the development of the large new orebody of siliceous silver ore opened between the 1300 and 1600 levels. This orebody, which showed indications of large size, on an entirely new far-east ore zone of the camp, was one of the important developments of the state during 1918. Much of the ore was broken with machine drills, carrying 40 oz. and upward in silver, without sorting. The limits of the orebody at the end of 1918 had not been determined. Arrangements were made to extend a spur from the Denver & Rio Grande R.R., but no work was done on this, hauling being accomplished by trucks. Several dividends were paid by the company. A new shaft 1300 ft. deep was sunk, and a new electric hoist, capable of hoisting from a depth of 2500 ft., and compressor equipment were installed. Other properties near the Tintic Standard were active and sunk shafts and did other development to prospect for the continuation of the

Standard's ore zone. Among these were the South Standard, Eureka Lily, North Standard, Copper Leaf, and Apex Standard.

The Tintic drain tunnel at the south end of the district was advanced. The Chief Consolidated sunk a new three-compartment, concrete-lined shaft, starting July 1, the depth being 324 ft. on Nov. 1, and to be 2000 ft. deep ultimately. A new 2500-cu.ft. compressor, an electric hoist, and pumping equipment were installed. The North Beck, controlled by Raddatz and associates, of the Tintic Standard, sunk a 1200-ft. shaft on the northwest side of the camp and is crosscutting for the west ore zone on which are the Centennial Eureka, Eureka Hill, Gemini, Ridge & Valley, and others. This shaft is in limestone not far from the underlying Tintic quartzite. Iron and other indications of mineral are found in the limestone at the surface. The Godiva had 15 lessees operating, and shipped some unusually high-grade silver ore. Work was also done on company account, a winze being sunk to the 1400 level. The Eureka Hill, Yankee, and Uncle Sam were worked largely by lessees. The Gemini, Ridge & Valley and others worked on company account and had various lessees working. The May Day started new development on the bottom, or 1100, level in mineralized ground.

Operations in Bingham Canyon

The total output of Bingham Canyon in 1918 was approximately 14,000,000 tons of ore. The Utah Consolidated shipped copper and lead ores; the Utah Apex produced lead and zinc; the United States Mining, Utah Metal and Tunnel, and Bingham Mines shipped lead and some copper, and the United States company also produced lead-zinc ores. This lead-zinc product was milled at the last-named company's Midvale plant and the lead and zinc were separated at the Huff electrostatic plant. The Utah Apex produced lead and zinc concentrates at its mill in Bingham. The Ohio Copper completed the installation of its new 3000-ton flotation plant and operated it, producing copper concentrates. Bingham Mines operated the Dalton & Lark and the Yosemite mines, and produced lead-silver and copper ores. Other producers included the Montana-Bingham Consolidated, which shipped a small amount of lead and low-grade pyritic copper ores, and the Silver Shield, shipping lead-silver ore.

The Utah Copper Co. operated steadily. Approximately 13,000,000 tons of ore was produced for the year, as compared with about 12,500,000 tons in 1917. The production of copper for 1918 was a little over 198,000,000 lb., slightly less than that of 1917. The record production of ore was made on Sept. 26, when 49,537 tons was mined in 24 hours. Of this 80% was produced on day shift. Several increases in wages were made by this company. On Feb. 1, wages were raised 25c. a shift for skilled labor at the mine and mills; 20c. for common labor at the mine (nine hours); and 15c. for common labor at the mills. On July 1, all employees at the mine and mill were granted an additional 50c. a shift. Wages in December ranged from $3.90 for common labor at the mines (nine hours) to $250 a month for steam-shovel engineers. Common labor at the mills received $3.55 for eight hours. All mechanics and skilled labor received $6.25 for eight hours. Influenza retarded production to some extent, as did also the inefficient labor. The Bingham & Garfield R.R. operated satisfactorily, and in the third quarter handled a daily average of 37,711 tons.

Some interesting questions of apex were raised in the Bingham camp in 1918. The Utah Consolidated, Utah Apex, and Utah Metal and Tunnel became thus involved, and a number of suits and counter-suits were filed. The Utah Consolidated purchased the old Yampa claim, and is also understood to have acquired possible apex rights from the Utah Metal and Tunnel, in connection with the above. Questions of apex were also under consideration in the southeastern part of the camp between Col. E. A. Wall and the U. S. Mining company, involving parts of the Jordan limestone. These cases will probably come before the courts in 1919.

Smelteries at Full Capacity Early in 1918

The Salt Lake Valley smelteries operated almost at full speed the first part of the year. There was a fair ore tonnage, and surplus capacity was used in treating material from the large stockpiles accumulated in 1917. Later, heavier inroads on stockpiles were made to replace the decrease in current production. No marked car shortage was felt by the smelters, though shortage of labor at the plants, and also influenza, held back operations. Wages were increased several times at about the same time as at the mines.

The Utah Ore Sampling Co. ran its Murray sampler and that at Silver City, in the Tintic district, and, in addition to the output from Utah, sampled ores from Nevada, Idaho, Colorado, Montana, and California, which came into the valley plants. Ore shipments also arrived at this market from Washington, Oregon, Arizona, Mexico, and British Columbia. The ores from without the state showed approximately the same relative decrease in tonnage as in Utah.

Production of Gold, Silver, Lead and Zinc

A limited amount of gold was produced from copper, lead, and mixed ores in 1918. Little straight siliceous gold ore has been mined in Utah in recent years, though a few cars were shipped from the Wedge, at Marysvale, in Piute County, and by lessees from the Blue Bird workings of the Annie Laurie mine, in Sevier County. The Centennial Eureka, in Tintic, produced a number of cars of 6-oz. gold ore. Also, some of the oxidized capping at the Utah Copper was found to carry an ounce and better in gold after having been discarded, and a number of cars of this capping was shipped. Some gold was contained in siliceous Park City silver ores from the Ontario and Daly; also in ores from various properties in Tintic, and a small amount from pyritic ores from Bingham. The Utah Copper concentrates carried appreciable amounts of gold and silver. These had an aggregate value of $804,409 in the second and third quarters of 1918. Some siliceous gold ores came in to the Valley smelteries from Goldfield and other parts of Nevada, and from Oregon.

Lead ores furnished a large part of the silver produced during 1918. The producers were the Silver King Coalition, Judge Mining and Smelting, Silver King Consolidated, and Daly West, at Park City. The Chief Consolidated, Centennial Eureka (copper-silver), Gemini, Ridge & Valley, Eagle & Blue Bell, and others in Tintic produced silver from lead ores, as did various

properties in Alta, the South Hecla, Michigan Utah, Wasatch Mines, Columbus Rexall (copper-silver ore), and the Cardiff, in Big Cottonwood. Straight siliceous silver ores were shipped by the Ontario, at Park City, and by the Tintic Standard, at Eureka, from its new large orebody. This ore carried 40 oz. and better, and was broken with machines without sorting. A few cars of siliceous silver ore was shipped by lessees from the Lion Hill Consolidated, at Ophir. Some silver was contained in the lead and copper ores from Bingham, from the Utah Apex, Utah Metal and Tunnel, Utah Consolidated, and the United States properties. Nearly every camp in the state shipped ores carrying lead and silver. The Deer Trail, at Marysvale, completed and operated its 100-ton flotation and cyanide mill for treatment of gold-silver-lead ore, and also produced direct-shipping ore. Utah ranks high among the silver producing states, and the 1918 output was somewhat greater than that of 1917, silver being practically the only metal which showed an increase.

Zinc-Ore Output in 1918 Relatively Small

A relatively small amount of zinc ore was produced in Utah in 1918, chiefly by the largest mines, the miscellaneous production from the various camps being light. The chief producers of zinc sulphides, mostly concentrates, were the Judge Mining and Smelting, at Park City, which treated its output in its electrolytic zinc plant, producing a high-grade spelter, and the U. S. Mining Co., at Bingham, which shipped a good tonnage of lead-zinc ores to its Midvale concentrator during the first 10 months of 1918, and produced several hundred tons of zinc-blende concentrates per month from material treated by the Huff electrostatic plant. Later, the company stored its output. The Utah Apex produced zinc sulphide ores and concentrates. The Midvale Minerals operated its 250-ton flotation tailings plant on the old United States concentrator dumps, and shipped lead-zinc concentrates to Anaconda. The Childers and Leasing Co. also made a production from a different part of the same tailings dump. The Caldo Mining Co., operating a flotation mill on the old Horn Silver dump at Frisco, Beaver County, made zinc concentrates running 43% and better, which were shipped East, and lead concentrates were shipped to the U. S. Smelting Co. The extraction was unusually good for an old dump of this character, being 68% and upward for the zinc, and 12 to 20% for the lead. Most of the lead had oxidized to anglesite.

Carbonate zinc ores were shipped by the Lake View Mining property, in Boxelder County; the Scranton, in North Tintic, and an occasional car of zinc ore was shipped by other mines in Tintic. A few cars were shipped by D. W. Lynch from Dry Canyon, near Ophir, but no zinc ore was produced in 1918 in Ophir itself. The Moscow, in Beaver County, shipped a few cars of ore mined in 1917. More zinc ores could easily have been produced with more moderate freight rates and lower operating costs.

Manganese ores were shipped during the first 10 months of 1918 from the Homansville section of the Chief Consolidated, in Tintic; by various properties in West Tintic, among which was the Liberty Manganese company; also from Green River, Utah, by the Needles Mining Co.; and by Hanawalt Bros., of Denver, who shipped most of the Utah output. The Stewart & Snyder lease and the Triangle lease of the Michigan-Utah, at Alta, shipped manganese ore carrying 42% and over. The Ophir Hill Consolidated shipped 44% manganese ore. A few cars were shipped from near Monroe and Marysvale, in the southern part of the state. Practically all of the manganese ores was shipped East. Production was discontinued soon after the signing of the armistice in November, on account of market conditions.

Relatively little interest was taken in antimony, there being only a few cars shipped. The Stibnite Mining Co., near Brigham City, in Boxelder County, shipped a car of good-grade ore. One shipment, less than a carload lot, was made from near Marysvale. Practically no antimony ore from Nevada passed through the Salt Lake market.

Scheelite was shipped in 1918 from near Lucin, in Boxelder County, and from Deep Creek, the latter being produced by Wilson Bros. This firm also shipped a small amount of bismuth ore, which was milled in Salt Lake, producing concentrates containing 20 to 30% bismuth. A small shipment of bismuth ore was received in the Salt Lake market in 1918 from Mexico. One car of bismuth ore was shipped from the Mammoth, in Tintic. A small shipment from near Douglas Ariz., was marketed through Salt Lake. A small consignment of molybdenum, less than a carload lot, was shipped from Deep Creek by Wilson Brothers.

Regarding uranium and vanadium, some carnotite ores were shipped to Pittsburgh from near Cisco, in Grand County. These ores were also mined at Castleton, in the south-central part of Grand County, by the U. S. Metals Reduction Co. The shipping ore carried about 2% U_3O_8.

Potash was produced from alunite by the Mineral Products Corporation at Marysvale, in Piute County. This company rebuilt its mill, which was destroyed by fire in 1917, and enlarged it to 200 tons. Steady shipments of potassium sulphate were made. The alumina was stockpiled, though some of it was shipped for the manufacture of high-grade fire brick and refractory material. The Florence Mining and Milling Co., at Marysvale, built and completed a 100-ton alunite mill at its mine in Upper Cottonwood Canyon. This installation consisted of roasting furnaces, or kilns, and a leaching plant. Some ore was treated. Swift & Co. became interested in the Bradburn claims, adjoining the Florence and Mineral Products claims, and erected buildings and installed a compressor. A 17-ft. vein of clean crystalline alunite was developed, and shipments were started to one of Swift & Co.'s fertilizer plants near New Orleans. The American Smelting and Refining Co. also worked the Yellow Jacket claims, on the east side of the camp. The Caraleigh Chemical Co.'s custom alunite mill at Marysvale treated ore from the Florence and other properties, the finished product being roasted alunite, which was shipped East.

Potash was also produced from the brines of Great Salt Lake, from the mother liquors of the Inland Crystal Salt Co., by the Utah Chemical Co., at Haskell, near Saltair. The Salt Lake Chemical Co., at Burmeister Station, on the Western Pacific, on the southwest side of Great Salt Lake, produced potash and common salt.

This plant is popularly supposed to belong to the Diamond Match Co. The Solvay Process Co. has a large potash plant at Salduro, on the salt beds near Wendover, on the Western Pacific, and produced common salt, potash, and magnesium chloride liquor. The common salt was made by a related or subsidiary company, the Capell Salt Company.

A car of high-grade fluorspar was shipped from the Granite Mountain district north of Dugway. The shipping point was Clive, on the Western Pacific, 18 miles from the Silver Queen Mining Co.'s properties. This car carried 97% calcium fluoride, and was shipped to California.

Here should also be mentioned a sulphur deposit near Black Rock, in Millard County, on the Salt Lake route, which was taken over in 1918 by Chicago interests represented by Michael Morrissey. A plant was built and preparations were made to produce sulphur, but so far as is known there was no output in 1918. Arsenic and cadmium were produced as byproducts from the baghouse at the U. S. Smelting Co.'s Midvale plant.

Petroleum in the United States

The petroleum output in 1918, amounting to 345,000,000 bbl. according to the U. S. Geological Survey, includes no less than 6,500,000 bbl. of crude oil removed from field storage, but excludes drafts aggregating 20,500,000 bbl. additional from stocks of pipe-line companies. The surface reserve of crude oil held by oil producers and pipe-line companies in the United States at the end of 1918 is estimated at 123,000,000 bbl., compared with 150,000,000 bbl. at the end of 1917. From these figures it is apparent that the demand for domestic petroleum in 1918 approximated 366,000,000 bbl. Exports of crude oil, for the most part to Canada and to northwestern Mexico, aggregated about 5,500,000 bbl., leaving a total of 360,500,000 bbl. available for domestic needs. This quantity was insufficient, however, and approximately 36,500,000 bbl. was imported, almost wholly from Mexico, to meet domestic requirements, that amounted in all to about 397,000,000 barrels.

The increase in output noted was effected in response to a steadily growing demand for petroleum, expressed in advancing prices for crude oil, which were stabilized, with governmental approval, at record levels during the closing months of 1918. As indicated by statistics the most pronounced response to the stimulus of war-time demand for petroleum was in the Central and North Texas, North Louisiana, and the Rocky Mountain and California fields, though the moderate gain credited to the old Appalachian field is significant. In the field last named the increase was due in large measure to the success of drilling in Kentucky, particularly in Estill, Lee, Lincoln, Breathitt, and Allen counties.

In California the principal source of new production was the Montebello field, a discovery of 1917, in Los Angeles County, which, with the Casmalia district, in Santa Barbara County, and with the older districts in both the San Joaquin Valley and the Coastal-Southern division, apparently succeeded in establishing a new record for oil production in California, in excess of 100,000,000 barrels.

The gain in the Rocky Mountain oil region is credited to Wyoming and is ascribed in part to the Big Muddy field, in the western part of Converse County, in part to the drilling of a few new wells of large capacity in the heart of the Salt Creek district, in Natrona County, and partly to the results of the provision of marketing facilities to the Warm Springs field, Hot Springs County, and to the Pilot Butte-Maverick Springs district in Fremont County. New and potentially important sources of oil production were proved in Wyoming in 1918, on Buck Creek, in Niobrara County, and on Rock River, in the eastern part of Carbon County.

Credit for the gain in the North Louisiana region belongs almost wholly to the Pine Island district, in Caddo Parish, opened near the end of 1917, and extensively and successfully developed during 1918. Near the end of 1918 a new oil pool of apparent significance, termed the Bull Bayou district, was opened in the southeastern part of De Soto Parish, about three miles south of the Crichton field.

Momentous developments, affecting the future supply of high-grade petroleum in the United States, took place in 1918 in the central and north Texas field, following discoveries of petroleum in considerable quantities near Ranger, Eastland County; near Caddo, Stephens County; near Brownwood, Brown County; and near Burkett, Coleman County, in 1917. About 60 oil wells were completed during 1918, and at the end of the year the new field was credited with a potential capacity of 50,000 bbl. of oil a day, though its actual capacity, limited by pipe line facilities, was only about 18,000 bbl. a day. The campaign of "wildcat" drilling radiating from the centers named extended over more than 40 counties in northern Texas before the end of 1918, and will doubtless result in the opening of other pools of high-grade oil in 1919. The decrease charged to the Oklahoma-Kansas field is accounted for by the failure of "wildcat" drilling to discover new areas comparable with the declining Cushing, Healdton, Eldorado and Augusta districts.

In Kansas new territory was opened in Butler County, north of the Eldorado field, and in Greenwood County, east of that district. In Oklahoma a prolific producing area, known as the Youngstown pool, was developed in Okmulgee County, and strictly new oil territory was opened in Stephens County, several miles west of the Healdton district.

The diminished output of the Gulf field is assigned to the settling of production in the Goose Creek pool, Harris County, Tex., and to the normal decline in yield of the other dominant pools in that field. New pools of promise were discovered in the Gulf field in 1918 at West Columbia, Brazoria County, Tex., and at Big Hill, Matagorda County, Tex., though neither added materially to production in that year.

Asbestos Production of five of the largest shippers in Canada during 1917 was 3708 tons of crude, 50,506 tons of fiber, and 3550 tons of sand, according to the Asbestos and Mineral Corporation. In 1918, the same five companies produced 2896 tons of crude, 74,109 tons of fiber and 14,038 tons of sand. The increase in tonnage in 1917 over 1916 was 3%, and that of 1918 over 1917 approximately 2%. The increase in value in 1917 over 1916 was 39%, and the value was even greater in 1918. Stocks at the mines are depleted, and it is believed that higher prices will rule during 1919.

The Economic Duties of the Engineer*

By W. R. INGALLS

DURING the last six months we have heard much in this country on the subject of reconstruction, or readjustment. Great Britain and France had begun considering it a long time previously. With us, however, the armistice came so suddenly that we had hardly got into it. Being thus taken by surprise, there was for two or three weeks a good deal of panicky talk about it, but since then, although the subject is about the most important of those confronting a sorely tried world, the academic interest in it has waned considerably. Apparently some people, who during the last two years have been drawing diagrams of organization and formulating plans on paper for the regulation of all human and industrial conduct—and, indeed, putting not a few of those plans into practice—had visions of restoring conditions to normal in a similarly official way. Their conception was not unlike what they might have had of a clock whose complicated mechanism had been altered to run in an abnormal way, which had to be taken apart once more and reconstructed according to its previous organism. But the interest of officialdom was distinctly moderated when the President in his address to Congress early in December revealed the absence of any Administration plan for reconstruction, and dismissed the matter with the suggestion that the people would probably work out their problems for themselves. Since then the mushroom bureaucracy has been most interested in dissolving and getting back to pristine occupations as rapidly as possible.

The President's remarks were, it seems to me, a mixture of wisdom and inattention. There was wisdom in the thought that the people would solve their industrial and commercial problems better than a bureaucracy could do it for them. There was inattention to the pressing need for readjustment in matters of direct business relations between the Government and the people, requiring prompt legislation to apply to conditions of canceled contracts, legitimate claims and the disposition of enormous accumulations of goods.

There were people who, scoffing at the bureaucratic ideas about elaborate, theoretical plans for reorganizing things, believed all along just what the President expressed, although perhaps their thoughts were based differently and were of broader scope. They knew from their previous business experience that commerce and industry, overtaken by a sudden emergency, could not, and would not, wait for plans to be drawn; but would go ahead and do things in their own ways, and that their doings would be expressed in the commodity markets and in the relations with labor, both of which expressions would be practical, not theoretical. Let alone, the mere readjustment would be completed before any academic plans could be drawn. The situation was not unlike that of the old story of a railway bridge in Montana that had been destroyed by fire. The bridge engineer and his staff were ordered in haste to the place. Two days later along came the superintendent of the division. Alighting from his private car, he made haste to see the old master bridge builder.

"Bill," said the superintendent, "I want this job rushed. Every hour's delay is costing the company money. Have you got the engineer's plans for the new bridge?"

"I don't know," said Bill, "whether the engineer has the picture drawed yet or not, but the bridge is up and the trains is passin' over it."

Our own industrial bridge is going up pretty fast, though the trains are not yet passing over it, and no plans were drawn. Yet the President was wrong, I think, in pronouncing that readjustment was simply an affair that the people themselves ought to manage. There are relations between the people and the Government to which the latter, in justice, should give earnest attention, as indeed it is now doing, but only partially.

Many contracts into which producers entered upon telegraphic or verbal instructions, as they do in ordinary business affairs, have been repudiated by governmental bureaus on the ground that they had not been signed and sealed in the statutory way. In many cases these contracts, now repudiated, were accepted by producers at the urgent request of Government officers, and shipments to fill them had begun.

The Government has canceled contracts that were duly signed and sealed and in so doing has given the other contractual party good ground for claim for indemnification of loss. Under present conditions of adjudicating such matters many legitimate claimants who are now young men will be old, old men before they receive what is due them.

The Government accumulated immense stocks of material of many kinds, which will have to be liquidated. The method of this liquidation will have a great influence upon the markets and consequently upon industrial conditions.

Unless broad and generous arrangements to provide for these plainly required matters of readjustment, to which the Government is a direct party, are promptly made, the situation will be fraught with some serious and immediate industrial dangers.

But while the people are rapidly attending to the general matters of readjustment that are involved in changing from a war basis to a peace basis, and while the Government is neglecting some of the relatively simple matters that obviously pertain to it, there is a broader phase of the new economic conditions that as yet we have scarcely begun to consider. Indeed, there is danger that we may be heedless in an hour of peril.

We began some time ago to talk about reconstruction. Then we made up our minds that readjustment was a more expressive word. I am not sure but that a word that is even more expressive of what we must consider is *reorganization.* That which has heretofore been uppermost in our minds, and perhaps is still, was the restoration of our old organisms, our old systems and methods of doing things. We may question whether so simple and so complacent a program is either all that is required, or even is safe. In the common happi-

*Presidential address before the Mining and Metallurgical Society of America, Jan. 14, 1919.

ness over the termination of the war, we run the danger of failure to appreciate the cataclysm that the world has experienced. I have listened to eminent financiers and industrialists prophesying an era of such prosperity as was never previously enjoyed by this country, and I have read many essays on the same subject that exuded optimism. Some have even dismissed the possibility, if not the probability, of troublesome conditions during the period of preliminary readjustment that many economists expected to follow immediately after the armistice, and that, indeed, is already upon us.

It is never popular to be pessimistic, but I suspect that many of those who have drawn the most optimistic pictures in public do not see things in quite so rosy a light in the privacy of their studies. A preliminary period of irregularity in business, accompanied by disturbances of more or less serious character, is inevitable. This will be the period when the pains experienced in changing from a war basis to a peace basis will be most acute. Following this there is reason to expect a longer period of illusory prosperity, during which the actual reconstruction in Europe is going on, during which the depleted warehouses for ordinary commercial goods are being filled up, and during which the deferred wants, both at home and abroad, for many articles are being filled. The housing and transportation facilities of this country are both, probably, behind the demands, and a great deal of material and labor will be required to furnish what the people need. But, nevertheless, I cannot foresee a long-enduring period of prosperity, not unless there be a good deal of reorganization in industrial methods.

The wealth of the world before the war was estimated roughly at about $600,000,000,000. The cost of the war is not uncommonly mentioned as being about $200,000,000,000, which is approximately the sum of the war debts of the several countries. Apparently, then, the wealth of the world has been diminished by about one third; but a little reflection will show that this cannot be so. America, Great Britain, Germany, Austria, and the neutral countries have all of the houses, railways, factories, farms, and public improvements that they possessed previously, although some of this plant, especially in Germany and Austria, has deteriorated by wear that has not been made good. France, Belgium, Poland, and Serbia still have the most of their physical property, the actual destruction in France being estimated at about $8,000,000,000 and in Belgium at about $2,000,000,000. German authorities estimate the destruction in France and Belgium at about $5,000,000,000. The destruction in Serbia and Poland is large, but is less than in France and Belgium. Russia had most of her property intact, though badly deteriorated until the Bolsheviki began to destroy it, since when the destruction there has been catastrophic. There is grave danger that the German bolshevists may do something similar in Germany. The world's loss of shipping is estimated at about $3,000,000,000. Great as these losses will total, they will be far short of $200,000,000,000, which figure includes the cost of the direct withdrawal of tens of millions of men from the production and accumulation of wealth; and the occupation of other tens of millions in supporting them. Such loss is of course the loss of what might have been created and saved rather than what was. Even the use of the metals and other materials in warfare, at the expense of the depletion of our mines and forests, has been largely the loss of what might have been rather than what was. The war debts of the several countries are in the main internal affairs, representing redistribution of accounts among the several nationals. Thus, the fact that the German debt is nominally a large proportion of the wealth of Germany does not mean that the latter has been impaired to that extent, or that Germany cannot assume the payment of a huge indemnity to the countries that she maltreated.

Nevertheless, the real loss by the war through the destruction of property and the impairment of property, and by the destruction and crippling of men, women and children, is not to be minimized. Although the property loss may not amount to one third of the world's total wealth, there is no doubt that its real amount can be represented only by a stupendous figure, and the same is to be said of the loss and impairment of population. It is estimated that the world's loss of life from causes due to the war, including the influenza, has been 26,000,000 souls during the last 4½ years. The number of those wounded, maimed, and shattered in health is greater than that. A world that has suffered such losses in material wealth, in life, and in the deterioration of the physical and mental powers of the populations of many of its countries cannot confidently look forward, it is evident, to any era of great prosperity, or even to a prosperity like what might have been expected if the war had not been; not unless some new ways and means of a superlatively compensating character can be devised. Any other thought would be equivalent to the idea that it would be a good thing for business if all the windows in the United States should be broken, which is an economic fallacy that was long ago exposed, although it is still entertained among labor unions. I say it would be preposterous to build hopes of a coming era of prosperity if the world is simply going to readjust itself to old conditions. Even if it does more than that—even if it institutes economic improvements of the first order of magnitude—there is grave doubt whether it can do much more during the next generation than make good its losses during the five or six years of war and demobilization.

There are, however, plenty of signs that the world is entering upon the new era with new ideas. Some of these are very hopeful. Others are distinctly ominous. Among the hopeful factors are the new thoughts and habits of the people, which may be summarized as the broadening of the vision of national and international relations respecting industry and welfare, the better appreciation of the principles of economics, the inculcation of habits of thrift, and the better understanding of common interest and the advantage of coöperation. The manner in which the American people saved food and fuel, exemplified best of all by the prompt adoption of gas-less Sundays, upon a mere request communicated through the newspapers, was one of the most exhilarating of events during the last year. Who will venture to prophesy that this spirit, now that it has been excited, is going to disappear?

On the other hand, there have been alarming exhibitions. Labor has been loyal during the war, but to a

large extent it has been misguided. It has failed to take full advantage of its opportunities. Enabled by the natural law of supply and demand to obtain wages that in many cases were fantastic, it has neglected to exercise thrift, and, on the contrary, has squandered not only its earnings but also its time, and even has let its efficiency diminish. It is unnecessary to go into details of this indictment, which every employer of men knows to be true in the main. Never before in the history of modern civilization did labor have such an opportunity to elevate itself in the economic scale while what are called the capitalistic and burgess classes were being reduced by taxation that was caused to fall especially upon them; and never was there such a misunderstanding of the nature of wealth as labor exhibited. Even now is there a demand, not only in America but also in Europe, that although the war is ended the war scale of wages shall not be reduced. Analysis of the fundamental conditions will be convincing, I think, that wages cannot be maintained at the recent level, that wages are not broadly a matter of arbitrary dictation to employers, and that when there is such dictation the result in the main is the profit of one group of labor at the expense of other groups of laboring men. The only way whereby real wages may be increased is quite a different one.

There prevails among workingmen, or among many of them, the idea that they are exploited by a class whom they call the capitalistic class, which is supposed to enjoy the major part of the fruits of industry, and that idea is cultivated by agitators and professional doctrinaires. Thus I read in a recent treatise entitled the "High Cost of Living" by Dr. Frederic C. Howe, that "In 1916 we (the United States) produced $45,000,000,000 of wealth. That is $450 a person, or $2250 for every family in the country. It is a sum adequate to raise a family in comfort even at the present high cost of the necessities of life." . . . "The total wages paid in the United States in 1916," continued Dr. Howe, "amounted to but $5,320,000,000, or 11% of the total wealth produced. . . . The explanation is to be found in monopoly, which has become all-pervasive." Therefore, according to Dr. Howe, the average wage per person was $53.20 per annum, or $266 per family. What could be more absurd? Consider that the 2,000,000 railway men averaged approximately $1000 per annum, or a total of $2,000,000,000, according to Mr. McAdoo's figures; that the employees of the United States Steel Corporation, about one-fourth of a million in number, averaged $1050. We ourselves know well enough what the men average in the great mining and metallurgical industries.

Scott Nearing, one of the most blatant of our socialists, asserted recently that if incomes were equalized all over the United States there would be enough for every workingman in the country to have $60 a week. Now let us see about that. Let us convert Professor Nearing's $60 per week to $3000 per year, disregarding the odd hundred. To give every worker $3000 per year the total income would have to be $120,000,000,000, whereas, in fact, it was only five-twelfths of that, according to the highest estimate for 1916, which was a very prosperous year.

The spread of such lunacies, which have been put into hideous practice by the Bolshevists in Russia, constitutes one of the great economic dangers that confront the world. It is true that the workmen of Russia, who acted upon the theory of "steal what has been stolen," have learned to their sorrow that the only things worth stealing are the accumulated stores of food, fuel and clothing, that they represent but a trifling part of the wealth of a country, and that when they have been consumed the rest is of no use without work; and that work is of insufficient productiveness unless intelligently directed. The facts that the experiments in uplifting the proletariat by stealing have failed in Mexico, and then in Russia, do not convince the socialistic doctrinaires. They will not learn until they have tried the same experiment everywhere. It is one of the great duties of intelligent people of all kinds, but especially of engineers, to eradicate this poison from the minds of the workmen, who exhibit its symptoms in various ways and in various degrees. The engineer is the natural enemy of Bolshevism, the natural enemy of all uneconomic thought.

In 1917 one Robert Bruere went to Arizona to report upon the social and industrial conditions at the time of the general strike among the copper miners. In one of Mr. Bruere's articles there was a subcaption "Copper Companies Regard Mining as a Matter of Engineering Rather Than of Democracy." Mr. Bruere reported an interview with a mine manager whose idea was that if mine managers played with democracy they would never get out the ore. "He did not consider mining to be either a problem of democracy or autocracy, but simply a problem in engineering," naïvely remarked Mr. Bruere, who added that the dream of this manager was a mine from which the ore might be extracted by automatic machinery, just as it is now crushed and concentrated by machinery.

Mr. Bruere was right in his discernment that we regard mining as a matter of engineering rather than of democracy. If we did not so regard it there would be mighty few mines of any kind in operation today, and the world would be wondering about its metal supply. There are big ore deposits today whose output will be needed, that we cannot yet manage to work, but hope that we can if we succeed in getting more mechanicalized. If anybody has any notion about running mines by democracy, he may usefully examine what the workmen did with the Spassky, Kyshtim, Ridder, and other great mines of Siberia. We know that Mr. Bruere was wrong in his fantastic notion that "democracy implies intelligence, initiative; and these are precisely the most undesirable qualities in a mucker." On the contrary, he might have learned, if he had taken the trouble to do so, that the great effort of enlightened managements everywhere is to increase the intelligence and initiative of the men and enable them to draw more pay for the simple reason that they earn it.

What engineer is there who does not know that the essential assumption of pure democracy as applied to industry—that production should be controlled by the people themselves—is in direct antithesis to the fact that in modern industrial life efficiency of production has increased as the efforts of the many have been directed and organized by the talents of the few? Must not every engineer of experience in leadership agree with Mallock, the great philosopher, that the oli-

garchic principle is as dominant in industry as it is in political democracy?

But superior to all industrial and political principles are economic laws, for it is those laws, which are laws of nature, that create and determine principles and practices. One of the greatest of economic laws is that of the survival of the fittest, which exhibits itself in competition, and from that is derived the classic economic doctrine that labor is the residual claimant upon the produce of industry. After the shares of the state, the landlord, the capitalist, and the entrepreneur have been deducted, all the rest goes to labor, and here is what is mystifying to many, to wit, rent, interest, and profits are limited by competition, and of them the laborer can get neither the share of the landlord nor of the entrepreneur by any economic means, while, as for interest, the residual claimant is benefited by every payment on account of capital used in the production of wealth, and is better off when a high rate of interest is being paid than when a low rate is paid. We may apply the principles to the concrete case of the United States.

The wealth of the United States at the end of 1916 was estimated at about $250,000,000,000. The production of things was about $50,000,000,000. These are very rough figures, as they are bound to be. Estimates relating to this subject vary considerably. I have mentioned the highest that I have seen. There is reason to suppose that the higher figures are more nearly correct than the lower. Anyhow, I am going to use the highest only to give an approximate idea of proportions. This was before the United States entered the war, and, according to the United States Bureau of Labor, we had 40,000,000 workers. Let us assume that rent, interest, and profits averaged 4% of the wealth of the nation, which would hardly be extravagant. That would account for $10,000,000,000 out of the total produce, leaving $40,000,000,000 for labor, or $1000 per worker. We have already seen that 2,000,000 railway workers and 250,000 iron and steel workmen received about that sum. Those figures are specific expressions of two whole industries. The workmen in some other industries earned more; in some they earned less. However, there is considerable evidence that the general average was about that figure, or something near it, and, anyhow, whatever error in statement there may be will not invalidate my following argument.

That labor does not get increased wages at the expense of capital (unless capital be confiscated, in which event the increased wages will not long endure) is illustrated by the experience with the railways in Great Britain and America. The governments guaranteed the bond and stock holders their average return for a series of pre-war years. In the United States this was $1,000,000,000 per annum, or just about 5% on the capital as reported by the Interstate Commerce Commission. The increase of $800,000,000 in wages has been paid by the public in higher freight and passenger rates. To have left the roads in private hands, compelling them to pay higher wages without permission to make higher charges, would have resulted, first, in impaired service and finally in the state having to take over the lines and supply the deficit in order to have any service at all, just as has happened with some of the street railway lines in Massachusetts. Thus, what is virtual confiscation aids the wage earner only slightly and only temporarily.

But apart from confiscation, the winning of increased wages by one group of labor is obtained only at the expense of other groups. The inequality in the distribution of wealth is not between the capitalist and the laborer, but rather is it among laborers themselves. There is ample ground for the surmise that the professional, clerical, shop-tending, and similar classes, and the salaried classes generally, have suffered especially at the hands of the railway operators, mechanics, artisans, builders, and miners, but the farmers and the factory folk have not been immune.

I am not going to enter upon any fine analysis of the very rough statistical data that I have given, and shall point out merely that after the state, the landlord, the capitalist and the entrepreneur have got their taxes, rent, interest and profits, of which the last three are severely limited by competition, labor gets all the rest, and what it gets is what it produces. The only way it can get more is to produce more.

It is unfortunate that the only way of expressing production is in terms of money. If it were possible to express it in terms of goods, there would be less misunderstanding. However, it is clear that if the total goods and the total population remained the same, it would not matter if the money value of the goods fell from $50,000,000,000 to $30,000,000,000, i.e. it would not matter at all if money wages fell from $1000 per annum to $600, as, indeed, they would fall inevitably. On the other hand, if commodity prices remained the same, and the value of products should rise from $30,000,000,000 to $50,000,000,000, labor would get so much more, for it would be producing more goods. This is the only way that the war scale of wages can be maintained, and it is a problem of capital, labor, and talent to coöperate in accomplishing it, for only by coöperation can it be done.

This is no preaching of capitalism as commonly understood, but is simply classic and proved economic doctrine. The workman who wastes time and material, the farmer who lets himself be led astray by foolish agrarian policies, the small miner who is similarly misled, the manufacturer and the railway company which fail to adopt efficient methods, the interests large and small which create monopolies or enter into agreements to exact non-competitive prices—all of these are counter-agents to progress in human welfare, although in varying degrees. Probably, on the whole, there is more intelligence among the great corporations than there is among the labor unions, and a better understanding of economic principles, but there are some labor unions whose leadership is bright and some corporations whose management is stupid, while of both there are many that are only mediocre. My thesis is rather that the only way whereby the condition of the mass of the people can be improved is for it to produce more, and the loss of capital and life that has been suffered during the last 4½ years makes it particularly essential now to give attention to increased production, to accomplish which we shall undoubtedly need to develop new systems and new methods. This is what I mean by the necessity for reorganization, rather than readjustment, after the war. And it is in such reorganization that the engineer must play a great part.

England is already making her plans, and unless we are careful she will get the start of us. Thus, I recently noted the following paragraph in a letter from an observant American traveling abroad:

"England is knitting together for work. The directors of capital and the organizers of labor were never more together. There have been no strikes in England against capital, only against government wages or failure of government to equalize matters as between war bonuses and high cost of living. England is studying efficiency and is preparing for the overseas competition of the future. Forty-six English factories, without trade union or labor opposition, have adopted scientific management, but no stop-watch can be used in any factory controlled by the United States Government, nor is it allowed by the labor unions to make studies in time or motion, or to compile records to promote individual efficiency."

Now, more than ever, should labor in this country be taught that its real interest is to produce more, which is to earn more, and employers should not attempt to diminish labor's residual claim by abolishing competition among themselves or artificially enhancing profits by other means. And just as it is the interest of labor to earn the maximum, so is it the duty of the employer, which means that he should ever be alert to improve his methods of production. Wide differences of plant efficiency, administration, etc., are really the inspiration of social unrest among workers, rather than conditions that are intentionally designed to be evil. The social reformer, who does not understand production, is a far less important person in the promotion of human welfare than the engineer, who does.

My rather discursive presentation of some fundamental economic conditions, and some approaching problems resulting from them, has been to furnish a background for my thesis of the economic duties of the engineer. America and Great Britain may be in no danger of either political or industrial socialism—the results of the recent elections in each country are reassuring as to that—but, nevertheless, some of the virus has got into us, and, anyhow, our affairs are bound to be affected by the back-wash from the revolutions in Russia and in Germany. Those adversities come on top of the direct destruction by the war in the countries that have preserved their stability. You may mark my words that the engineer is going to have from now on such obligations as he never had before. How he will live up to them remains to be seen. Certainly he will live up to them best if he knows what they be. I can do no more than state them as I see them. Perhaps I see only a few of them. Without any doubt I fail to see all of them.

First of all what I see is that the engineer should saturate himself with sound economic doctrine. This is just as much the basis of his professional work as are the sciences of physics and chemistry; and the fundamental laws of economics are just as immutable as are the laws of gravitation and indestructibility of matter. The engineer-economist cannot possibly be a socialist, or a semi-socialist, nor even an industrial democrat; for it is his business to produce, and socialistic tenets do not tend toward production.

The engineer must be not only a counter-agent against the destructiveness of the proletariat, but also must he direct himself against the sluggishness of tortoise-like capitalists. One of the cardinal principles of American engineering during the last 20 years has been the exchange of information and the promotion of publicity about everything—technical processes, business relations, corporate affairs. We have seen America forge ahead largely owing to the absorption of this idea, while Great Britain lagged behind and almost went asleep at the switch. She is wide awake now. Let nobody forget it. But we ourselves have got to go further in publicity than we have gone heretofore. Publicity has been a favorite word among us, especially among mining engineers, who have created more openness in the affairs of their profession and their corporations than exists anywhere else. In reading one of Hobson's treatises not long ago I found a word that struck me more emphatically than publicity. He spoke about transparency, and said that "Perfect transparency of industrial operations, perfect fluidity of labor and of wealth, would effect incalculably great economies in the production of commercial wealth." And he said further: "No fact bearing on prices, wages, profits, methods of production, etc., merely concerns a single firm or a single body of workers." The more you think about that the more will you be impressed by its truth and its merit. Further effort toward perfecting the transparency of industry is, then, another of the economic duties of the engineer for the promotion of the production of wealth.

I have just quoted from Hobson's work on the "Evolution of Modern Capitalism." In an addendum to that book, written in August, 1916, he outlined post-war economic problems in a way that was prophetic. Let me quote one paragraph: "After the war, the task of economic reconstruction will compel the adoption of bolder experiments, both in public and private enterprise, than had hitherto been thought possible. To realize the enlarged productivity, more pacific coöperation between capital and labor, employer and employed, is a first essential. The immediate peril of an economic situation in which labor seems liable to a sudden fall of wage from the artificially inflated war level will evoke conscious efforts to find ways of harmonizing the interests of capital and labor. The issue is one of devising adequate and reliable stimuli to draw from the workers a larger and more regular output of productive energy, a greater willingness to adopt and apply new mechanical and business methods, and, in general, to coöperate more effectively with the other factors of production."

There was real vision in that forecast of 30 months ago. I may be captious in my criticism of it for its reference to capital and labor, which antithetical representation of two parties alone is always irritating to me. Even some of the socialistic writers recognized many years ago that it was necessary to consider the talented classes as well as the laboring and capitalistic; and recently Lenine and Trotzky, appreciating that the confiscation of capitalistic wealth would not reduce Russia to a dead level of equality so long as they allowed talent to exist, logically began the massacre of the intelligentsia. Labor, capital, and talent are a trinity, which one of our rough-and-ready philosphers not long ago represented as a three-legged stool. Among the talented, who are so eminent as the engineers, and whose is more clearly the duty of devising the new stimuli that must be provided?

But while devising stimuli for the workmen let us not forget the need for opening the eyes of the employer to his own defects, and I do not mean defects in his human relations, but rather his economic defects. For an employer may be a generous and lovable captain, whom those working for him may affectionately call "the old man," and yet he may be their worst enemy, an economic impediment, owing to his ignorance and backwardness. Just as there is a class of no-rent lands which determine the price of agricultural produce, so is there a class of no-profit employers who determine the rate of wages. I have previously in this address adverted to this subject, and indicated that the leaders of the workingmen should direct their energies against the inept employer who is their real enemy, rather than against the great profit-making entrepreneur who is their best friend.

Sometimes we see the backward manufacturer stirred to new and better things by the threat of imminent extinction through the advent of a new competitive process. Thus, about 20 years ago the contact process of making sulphuric acid promised to displace the classic chamber process, and abolish millions of dollars invested in plant, but the chamber-process men bestirred themselves, improved their practice, and held their own. Right now we see in the electrolytic process of zinc extraction a dire threat against the distillers, and the probable dislodgment of some of them. There will not be an extinction of them as a class, but there will be a case of the survival of the fittest; and those will be the fittest who first improve their practices in ways for which there is room, but which they will not take until necessity drives, necessity in this case being the danger of losing all of their capital tied up in plant.

We have seen how in ante-bellum days Great Britain practically lost important metallurgical industries, such as zinc smelting and copper smelting, in which she was once preëminent, and we see her now keenly studying and introducing improvements that will rejuvenate her and not unlikely put her ahead of us if we do not look out. Similarly in France, Spain, and other countries, where important steps are already being taken. But few people here appreciate the alertness and intelligence with which the Europeans are entering upon a new program, for the simple reason that they know they have got to do it. It is one of the immediate economic duties of American engineers to see that our own industries do not become blind to the reorganization that is being started elsewhere and ought also to be considered here. I am not now thinking in terms of individual enterprises, many of which may be, and doubtless are, very efficient; but rather am I thinking of industries as a whole.

And just as we must think of industries as a whole, so also must engineers think and act as a whole. The individual, no matter how superior he may be, cannot alone make very much of an impression. Indeed, his influence may be greater abroad than at home, and may be more to the advantage of foreign people than his own if he be unsupported by a body of colleagues at home, as witness the influence of Orville and Wilbur Wright in aëronautics.

I think it is an indictment of the engineering societies of this country that they have made no general efforts for the advancement of economic conditions. Their meetings have been pleasant social functions, the benefit of which is not to be decried. Their printed transactions have been the repositories of valuable technical papers, which are useful for reference and guidance. But in their practical indications, in their practical push toward better things, they have been insignificant in comparison with the splendid efforts of the American engineering press, respecting which we may proudly say *ne plus ultra*. Pray forgive any impropriety in my expressing this, for of course I have not in mind my own trifling part in what hundreds of papers have done with the coöperation of the industries and professions that they represent.

The Mining and Metallurgical Society of America is one of the few professional organizations that has aimed to improve economic conditions by active concerted pressure representing the consensus of professional opinion. Its efforts have naturally been confined to its own industry. In spite of its small membership, which smallness is, after all, inconsequential, so long as there is the right quality of membership, this society undeniably did most in recent years to improve the transparency of the mining industry. With equal assurance may it claim the credit of giving the impetus to the movement for greater safety for miners. And also may it claim the crystallizing of the movement for a reform of our archaic mining laws upon new lines, as to which the mining industry is in almost unanimous agreement, the actual drafting of the new legislation having been delayed by the advent of the war. It is exactly such kind of work, now with regard to some broad economic principle, now with regard to some plans for new legislation, and at other times, at the present time, with regard to purely technical questions such as the status and particular problems of the copper, lead, zinc, or iron mining industries, that mining and metallurgical engineers must act unitedly through a body like this, if we are going to achieve the right reorganization in this country. And what we do in our particular field, so must the civil, mechanical, and electrical engineers do in theirs.

With the entry of the United States into the war, the engineers of the country, like everybody else, enthusiastically offered their services to the Government. I think that the engineers were particularly eager, for they knew from the previous experience of our Allies that it was an engineering war. Our own members, and those of other societies, and engineers generally, entered the services and undertook duties at Washington and elsewhere in great numbers. Now, far be it from my thought to minimize their accomplishments. The job was done, the war was won, sooner than we expected and more victoriously than anybody ventured to prophesy; and that was the principal thing. We performed some marvelous engineering feats in building cantonments, in repairing the German ships, in organizing and equipping a great Army and transporting it to France, in building shipyards and ships, in feeding our Allies and supplying them with materials. I cannot hope to enumerate all the praiseworthy things that we did, largely through the instrumentality of our engineers. Yet I cannot overlook that according to General Pershing's official report, made after the armistice, his armies had fought with French guns, British tanks, and French and British aëroplanes, although 19 months had elapsed since the United States entered the war. Nor can I forget the coal famine, and other industrial

troubles in this country, and consider that the engineers of the country did all that they might. It was not their fault that they did not. They wanted to do everything in the best way, anyhow to give the best that was in themselves. The engineering societies did loyal and effective work in so far as they were asked or permitted. Yet is seems to me that the delay in starting shipbuilding, the subsequent aëroplane fiasco, the mess about making the 75-millimeter guns, and some mix-ups in our own industry show that our engineering bodies did not exercise the pressure toward prompt and successful accomplishment that they might have done. Sometimes, when we knew that things were going wrong, we let ourselves be swayed by emotions and by condonations that any one of us would have regarded as short of his duty to an individual client.

The wicked war is now ended, thank God, and the hurly-burly of doing things quickly, without counting cost, is past. We are entering upon an era not merely of reconstruction or readjustment, but of reorganization in which it will be many years before we shall be able to form much of an idea of what the result is going to be. There is every probability that engineers are going to be called upon to play a great part in this, and now, fortunately, they will be able to give more deliberate consideration to the study of problems and the formulation of plans than they could during the war. They will have to work individually and also concertedly through professional bodies like this. If they fail to do so, they will be derelict not only in their economic duty, but also in their duty as citizens of the Great Republic, whose welfare must not be permitted to suffer during the coming period of competition and elevation among our friends and rivals.

Straightener Made From Old Air Pumps

By Claude T. Rice

In the machine shop of the Hecla mine at Burke, Idaho, there is a formidable-appearing as well as a much-used machine called the press or straightener. This machine was made several years ago from the air cylinder of an old compound 10 x 18 x 6 x 18-in. Jeanesville mine pump that was about to be sold for scrap. The cylinder is mounted vertically upon a base, which is an old compressor disk 52 in. in diameter and 6 in. thick. The water-end piston rod of the pump has been forged out into a plunger, and a lever arrangement has been mounted upon the valve chest so as to control the flow of air to the cylinders.

There are several different pieces that rest on top of the base to act as anvil blocks when pressing pulleys, etc., on and off shafts or axles, but one of the main uses of the press is in straightening old rail and pipe. By using a 4 x 4-in. steel bar, 4 ft. long, for a straightening block, and holding the pipe by means of discarded clamps from 6-in. rock-drill bars, and clamping one at the top of the pipe directly under the plunger, pipe up to 6 in. diameter can be straightened. For straightening rails, the same 4-in. bar is used shimmed up with thin pieces of iron. The rail is placed on this block and straightened 4 ft. at a time, working it back and forth under the plunger. As the bend in the rail is generally sideways, blocks are arranged so that pressure is brought upon the head and web of the rail rather than on the flange, and a steel block is put under the plunger so that it will press only against the head and web of the rail. The machine serves a useful purpose in salvaging old pipe, rails, and bar iron.

Grong Pyrites Mines, Norway

The purchase, by the state, of the Grong sulphur ore deposits for the sum of 10,593,000 kroner was recently sanctioned by the Norwegian Diet, and was reported in the *Chemical Trade Journal and Chemical Engineer.* The Grong mines are at present under the management of the Electrochemical Industry Co., and the more important deposits within the group are the Joma, the Gjersvik and the Skorova. The Joma deposits are said to contain 6,500,000 tons of ore, most of it carrying 44 to 45% sulphur and little copper. The Skorovas deposits contain at least 1,000,000 tons, almost entirely free from copper, having 50 to 51% sulphur, and free from arsenic. The Gjersvik deposits are estimated to contain about 1,200,000 tons of ore containing 2.2% copper and about 42% sulphur. Thus the aggregate content of the Grong mines is at least 8,500,000 tons. When the transport arrangements have been completed, the annual output should amount to about 400,000 tons. The shares of the Grong mines were principally in French hands.

Advantages of Underfeed Firing

Plants using underfeed stokers claim to have reduced the cost of power-house operation from 15 to 25%. The percentage of CO_2 in the flue gases is a guide to the efficiency of the furnace and may be determined by the use of the proper instruments, or by observing the amount of black smoke coming out of the stack, or the amount of carbon in the ash. Faulty combustion is due to several causes, one being that if fresh coal is shoveled directly into the furnace it is literally "too green to burn," whereas if the coal is preheated slightly, but not enough to distill the volatile matter, before it enters the incandescent fuel bed, the combustion is immediate and perfect.

The underfeed stoker permits the introduction of "hot" coal into the fire from below while fresh coal placed in the hopper is forced by cylindrical rams into retorts that underlie the fuel bed. These retorts resemble troughs, which are inclined from the hopper down and across the furnace, and are separated by rows of tuyeres that support the burning coal and furnish air to the fire. The rams fill the troughs and force in more coal, which crowds the coal already in the troughs up to the tuyeres, where the combustion is completed. During the time that the coal remains in the troughs, before it is forced up, it is heated to such a temperature that distillation readily takes place, and so it is in perfect condition for complete combustion.

Underfeed stokers are equipped with an auxiliary forced draft system that insures the correct amount of air for perfect combustion. Fewer firemen are required to handle them, so that labor is released for other purposes. The types are adapted to many kinds of coal and have a wide range of flexibility, which is desirable where a high peak load is necessary.

Bill Introduced To Legalize Informal Contracts

On Dec. 9 Representative Dent introduced a bill (H. R. 13,274), which was referred to the Committee on Military Affairs, to provide for relief to manufacturers who accepted orders on contracts by telephone or over the signature of persons not fully authorized to conclude contracts.

During the war many orders were given and accepted by manufacturers for war supplies required by the Government which the Controller of the Treasury now rules are not valid contracts, holding that payments thereunder cannot be made without special legislation. Certain contracts were signed by chief assistants instead of the chief of the procurement division of the Ordnance Department. Certain orders were not on proper forms and were not signed by both parties to the contract. In other cases agreements were entered into verbally or in writing, but owing to the urgency of the cases manufacturers were asked to and did proceed with their work pending receipt of formal contracts which were not fully completed before Nov. 12. In still other cases manufacturers had bought supplies and started work even before the details had been agreed upon.

It is on the assumption that manufacturers did their utmost to facilitate production on Government account without waiting for contracts, and trusting that the remuneration would come in due course, that this bill was introduced. The bill as reported back to the House from the committee authorized the Secretary of War to settle any agreements, expressed or implied, upon a reasonable basis, that were entered into in good faith prior to Nov. 12 by any agents of his department. These claims may include lands, supplies, materials, or equipment to be used for war purposes and contracted for in a manner not in accordance with the prescribed law. All claims must be presented before June 30, 1919. No provision is made for suit against the United States upon agreements of the nature specified. Provision is made, however, against fraudulent or unjust settlements, if in the hurry of their consideration it is subsequently found that injustice has been done.

The Senate Committee on Military Affairs has rejected Secretary Baker's recommendation that the War Department handle this matter, and has reported Senator Hitchcock's bill covering practically the same matter but placing adjustment in the hands of a non-interested commission. There is not much doubt that both houses, already in substantial accord, will early agree upon a bill that will permit of these very just claims being satisfied. It is to be regretted, however, that no provision has been made for the hundreds of claims that will be made not falling specifically within the bill.

Whether just or unjust, such matters will have to be brought before the Court of Claims, and if business is handled there as it has been in the past, equitable adjustment may be delayed until the third or fourth generation. In other words, the Court of Claims as now constituted cannot render justice. Men who will come before it have done more than their share, and it is the duty of our Government to see that they do not suffer unnecessarily. It is hoped that an amendment to this measure will provide for consideration of all war claims not otherwise provided for.

The Matthews Cable Clamp

Insulated-wire-cable electric conductors, whether in mill or mine, require special means for holding them taut when required to turn corners of whatever angle

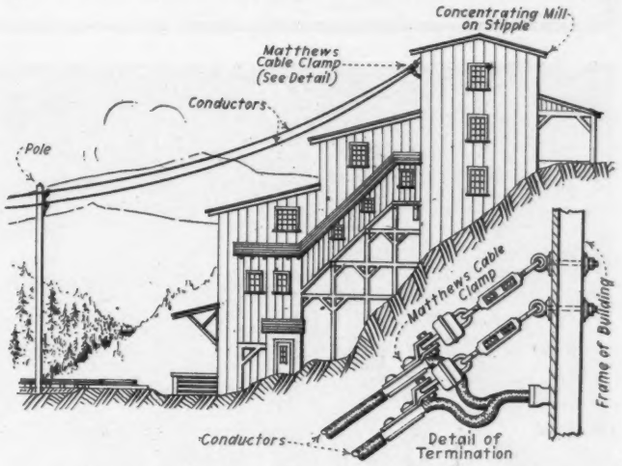


FIG. 1. CABLE CLAMP FOR POWER CABLES

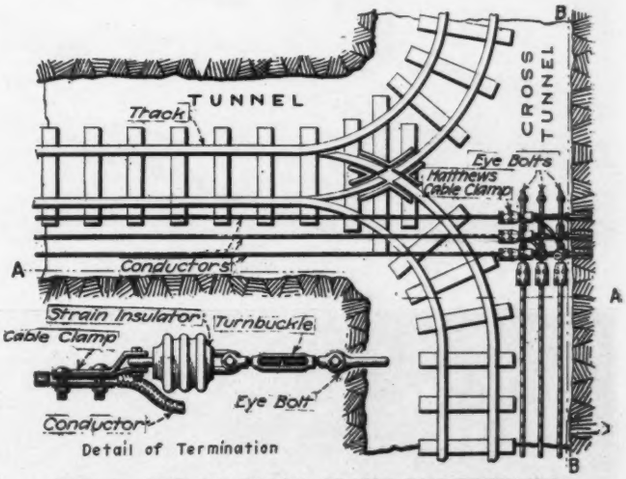


FIG. 2. USE OF CABLE CLAMP UNDERGROUND

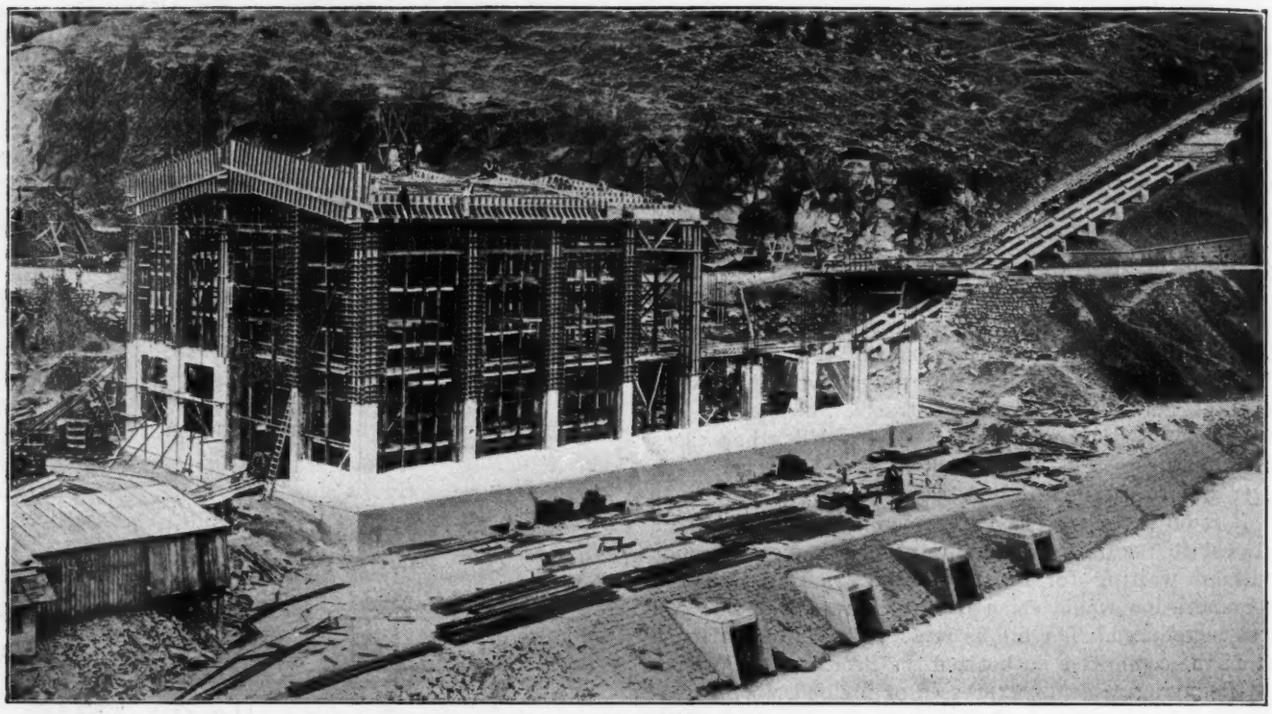
or to enter the side of a building. In the accompanying illustrations the Matthews cable clamp is shown both in detail and in use. It consists essentially of a tension insulator between a turnbuckle and a cable clamp. One end of the turnbuckle may be bolted to building walls, foundation or other anchoring medium, and a short circuit cannot be created, because of the provision of a strain insulator, as shown.

Clips on Starting Sheets

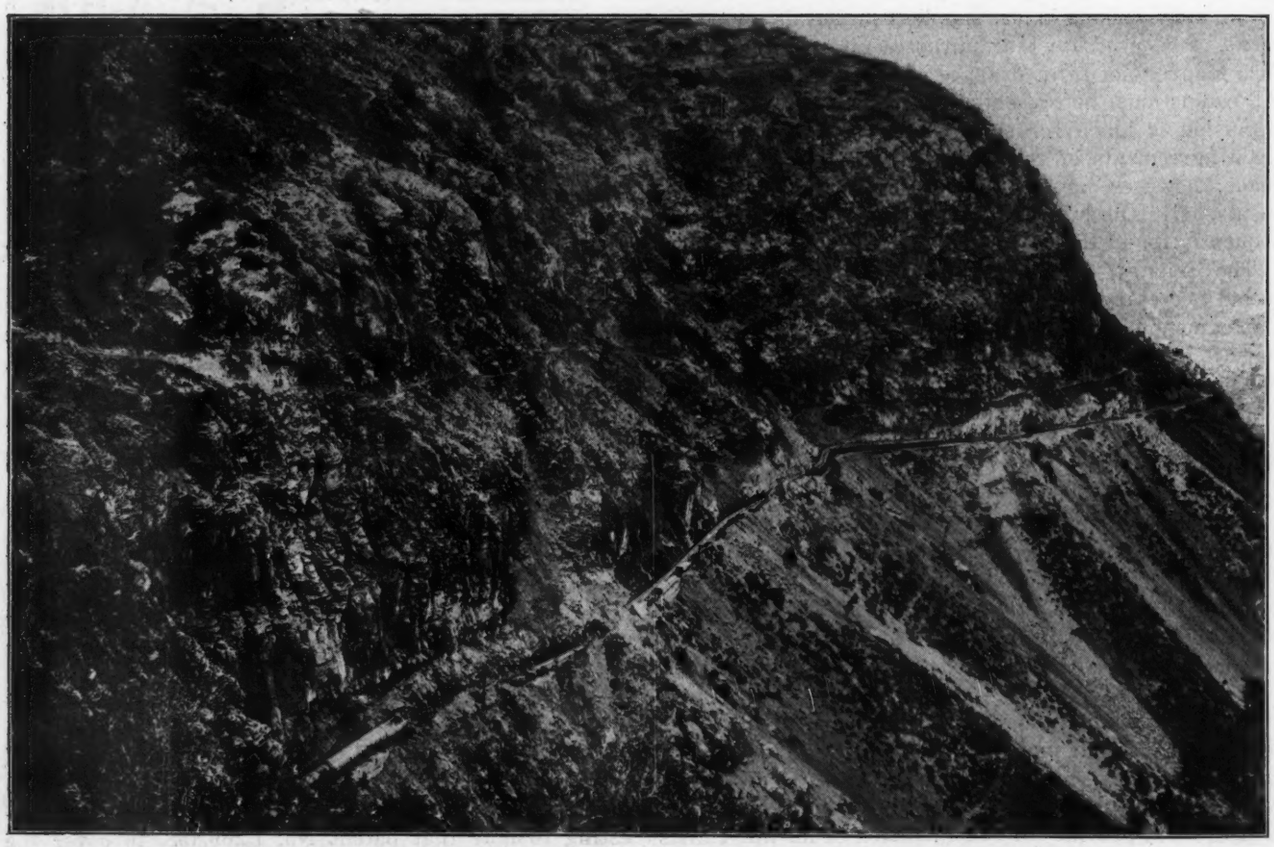
In the issue of the *Journal* of July 20, 1918, publicity was given, on p. 114, to a novel method of attaching clips to starting sheets when difficulties are experienced in using an electrolyte containing impurities having a corrosive action on the cathode.

Attention has recently been drawn to the fact that the modification was due to the ingenuity of H. A. Tobelmann and Henry S. Montgomery, and that it had been developed and had proved successful at the Ajo plant of the New Cornelia Copper Co. It is also interesting to note that patent No. 1,269,458, to cover the invention, was issued on June 11, 1918.

Braden Copper Company's New



THE 20,000-KW. PANGAL POWER HOUSE UNDER CONSTRUCTION



VIEW SHOWING RUGGED NATURE OF COUNTRY THROUGH WHICH 80-IN. FEEDER PASSES

Pangal Power Project in Chile

CONSTRUCTION CAMP AND 80-IN. DIAMETER REDWOOD STAVE FEEDER LINE AT DIVERSION DAM

DOWNSTREAM SIDE OF DIVERSION DAM WITH CONCRETE OUTLET CONDUIT

Alabama Graphite in 1918

By W. F. PROUTY*

THERE was a steady growth in the Alabama graphite industry in 1918, despite the serious freight-car shortage in the latter period of 1917 and during the early part of 1918, and despite, also, the serious handicap produced by the labor shortage and the difficulty of getting repair parts and new machinery. Fourteen plants reported sales in 1917. Thirty plants were in operation in December, 1918; 24 of which were working in Clay County, 5 in Coosa County, and 1 in Chilton County.

Alabama is credited[1] with furnishing 59% of the quantity and 66% of the value of the domestic crystalline graphite sold in this country during 1917, an increase of 19% in value over 1916, and three times the value of the output from Alabama in 1913. The sales from Alabama in 1918 will probably show a still further advance of Alabama's position as a producer. During 1918, two mills, that of the Empire Graphite Co. and that of the Eagle Graphite Co., were completely destroyed by fire, which also destroyed the concentrating plant belonging to the Griesemer Graphite Co. Two of these plants are now being rebuilt, and the third company is making preparations to rebuild.

Producers To Improve Methods Rather Than Extend Plants

Two or three new graphite companies are planning to construct mills in the near future, but the great rush for new plants is over, and the business is now settling down to determine ways and means of increasing the percentage of recovery, reducing the cost of production, raising the grade, and standardizing the product. Consolidation of some of the companies has already taken place, notably that resulting in the forming of the Quenelda Graphite Corporation. Other companies are considering consolidation, for the gain from such action secures not only economy of management and reduced cost of production, but, perhaps, what is more important, a better standardization of the product. The percentage of No. 1 flake is increased by the mixing of larger and finer flake from the different mills, and this is of especial advantage in the mixing of products from the wet and the dry processes.

Processes Practiced in Milling Alabama Graphite

A number of processes are used in the Alabama graphite field for the concentration and milling of the ore, and of these there are many varieties, so that no two mills in the whole field use the same process throughout. In a general way the processes can be classified into those which are entirely wet or entirely dry, or consist of a combination of wet and dry methods. The majority of the plants combine both wet and dry processes. In some, however, the dry process is restricted entirely to the finishing plant, whereas in others dry methods of concentration are used along with the wet. An example of an entirely wet process is seen in one of the mills where the wet concentrates from the oil-flotation method are run over Diester tables, with the result that the final concentrates are sufficiently high in carbon content to be marketed without first passing through the buhr. Two Alabama graphite mills are employing entirely dry processes. The Graphite Mills, Incorporated, near Ashland, uses the Sutton, Steel & Steel process, and the Flaketown Graphite Co., near Mountain Creek, Chilton County, makes use of a modified electrostatic method.

Classification of Washers

The greatest diversity of methods is in the concentration plants, and there is considerable differentiation here in the type of washers used. These washers can be classified into those using water without oil, and those using water with oil. Of those using water without oil, there are the following varieties: The Ashland washer, which was the type first used successfully in the Alabama field for the separation of graphite from ore in commercial quantity. It consists of a long, narrow trough, into which the crushed and dried ore is fed from a steeply inclined surface on one side. The water moves across the surface of the trough to the opposite side, carrying the graphite by surface tension and spilling it into the launder, and the quartz and other gangue minerals, which are wet by the water, sink and pass out through small holes in the bottom of the trough with the surplus water to the dump. This type of washer has been installed in a few of the plants.

A more uniform distribution of the ore to the washer is accomplished by a roller feed, and in one of the plants such a modified Ashland washer is being used. The Monroe-Conklin washer is a still further modified and improved washer of the Ashland principle. Its advantages are in its adjustable roll feed, water control, easy-leveling possibilities, and smaller or unit characteristics. This washer can be adjusted to ore of different size, or ore containing much or little mica. The Colmar washer, which follows the general Ashland principle, is circular in shape, has a cast-iron bowl, and the core is fed from a revolving disk at the center of the washer. The water rises from the bottom and spreads out from the center of the top toward the sides. The advantages in this washer lie in the fact that the surface increases toward the periphery. The particles of ore and graphite are thus less crowded as the launder is approached, and the reduced velocity of the water gives a better chance for the settlement of the finer particles of quartz.

In some of the mills the revolving disk of the Colmar washer is replaced by a cone feed, the advantage being that less dust is produced. The disadvantage of the cone feed is a less even distribution of the ore. Still another type of water flotation without oil is to be found in the log washer, which has proved its worth as a means of separating graphite from the gangue. The crushed wet ore is fed to the washer. The sand is carried slowly up the inclined trough, and the graphite particles float off on the water and the sand is further removed from the overflow by settling on a sloping

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[1] "Mineral Resources of the United States," 1917.

cement floor, which is constantly sprayed to remove the graphite.

Since 1915, oil-flotation processes have been tried in a number of Alabama mills, and on the whole are proving more popular than any other method of concentration. Both Callow and Minerals Separation cells are being used. The treatment of the ore in these plants varies chiefly in the kind of classifier used in front of the cells, or in the method of the reduction of the ore, as gradual reduction by rolls or reduction by ball mill.

Three other distinct but somewhat similar oil-flotation processes are to be noted in the field at this time. In each of these the agitation, if such it may be called, is accomplished by jets of water taking the air down into the oil-water-ore mixture. In each of these instances, unlike the result obtained in the Callow and the Minerals Separation processes, there is no accumulation of froth. In the Cobb-Jet washer, the jets of water are introduced along the central axis of a rectangular wooden trough. The launders are placed on the sides of the trough and there is a bottom discharge for the tailings. The Simplex washer is of metal and is elliptical in shape. The jets of water near the center cause a circular and outward movement of the surface water and the graphite toward the peripheral launder. In the Loventhall-Nunnaly washer there is a combined water jet and an inclined screw conveyor. The graphite floats off in much the same manner as when the log washer is used; the sand is also disposed of in a similar way.

In most of the mills, the dried concentrate is first sized and air treated, to eliminate as much sand as possible. In some cases a small percentage of the flake thus air treated is sufficiently high in carbon to go immediately to the shipping room, but the larger percentage of the concentrate must be run through the buhr to polish the flake and separate it from the attached mineral particles, which tend to keep down the carbon content of the finished product.

Costs and Schedule of Prices

The cost of production of graphite has risen greatly since 1913. The costs also vary for the different companies, and for the same company at different times. This is due in no small measure to the loss of time in making repairs and in replacing broken parts, and to the uncertainty of labor. After careful consideration of the cost of production, and allowing for a reasonable profit only, the Graphite Producers' Association of Alabama has suggested the following prices as being just, at this time, both to the producer and to the manufacturer. To this suggestion the Government has consented, although there has been no price fixing:

SCHEDULE OF PRICES ADOPTED BY THE GRAPHITE PRODUCERS' ASSOCIATION OF ALABAMA

Grade	Per Cent. Carbon	Price per lb.
No. 1 Flake	90	20¼
No. 1 Flake	85	15½c.*(a)*
No. 2 Flake	80	10c.*(b)*

Per Cent Carbon	Price Per Lb.	Per Cent Carbon	Price Per Lb.
25 to 30	1c.	60 to 65	4½c.
30 to 35	1½c.	65 to 70	5½c.
35 to 40	1¾c.	70 to 75	6½c.
40 to 45	2c.	75 to 80	7½c.
45 to 50	3c.	80 to 85	10c.
50 to 55	3½c.	85 to 90	12c.
55 to 60	4c.		

(a) With 1c. added for each per cent. above the 85% carbon.
(b) With ½c. added for each per cent. above the 80% carbon.

TERMS: F.o.b. Ashland, Alabama, or nearest shipping point; 75% of invoice payable upon receipt of bill of lading; balance upon receipt and satisfactory examination of material.

The experience of certain crucible companies with admixtures of domestic flake and foreign graphite has proved so successful that the Government is now requiring all crucible makers to use as much as 20% admixture of domestic flake. It is thought that this requirement will continue at least until the middle of 1919. The Bureau of Mines is now carrying out other experiments in the use of domestic flake, these tests being made both with an admixture of foreign and domestic, and with the domestic alone. Crucibles have already been made with a substantial percentage of American flake, and are giving good results. Dr. Stull, superintendent, Bureau of Mines experiment station, Columbus, Ohio, is also working on a mixture, using 100% domestic graphite and domestic clay in a crucible which he says appears to possess more desirable qualities in the original mixing than when 100% Ceylon graphite is used. The outcome of the experiments at the Bureau of Mines experiment station will be watched with much interest, as the indications are that the domestic flake is going to be more highly esteemed than formerly for crucible making.

The requirement of an admixture of 20% domestic flake has not only temporarily increased the demand for this product, but will doubtless assure an increased demand for the future, as a number of the crucible makers who have previously used foreign flake exclusively are now employing a formula including, in some cases, more domestic flake than the Government requirement.

Position of the Domestic Graphite Industry

Since the signing of the armistice, the sales of domestic flake have fallen off considerably. Crucible men are buying as little graphite as possible, and the producers' stocks on hand are getting uncomfortably large. A sudden lifting of the embargo on foreign graphite would at this time be disastrous to Alabama producers, as the industry, developed to a considerable extent as a war measure, is yet in the experimental stage when production is more costly than it should be after a standardization of the processes. If the embargo were slowly lifted, and an import duty was placed on such foreign graphite as is admitted, at first sufficient to maintain approximately the present price, and this duty gradually lowered, the industry would be able to meet the conditions of a lower price and a cheaper foreign-labor product.

If the Government should see fit to protect the graphite industry through this brief critical period of standardization of graphite processes and products, so that a more independent position as regards market is secured, there is reason to believe that the Alabama graphite fields will continue to be an important factor in the world's graphite production.

The Luxemburg Iron-Ore Industry.—In 1917 the Duchy of Luxemburg produced 4,276,550 tons of iron ore, compared with 6,752,207 tons in 1916. The average selling price per ton of ore in 1917 was 4.17 fr. against 5.41 fr. in 1916. The reduced output was due to the fact, says the *Ironmonger*, that the Luxemburg blast furnaces were compelled to restrict their production of pig iron, owing to the inadequate supply of coke. The only available export market was Germany, where the competition of the Lorraine works was keenly felt.

Cuban Manganese in 1918

By John B. Stewart*

The production of manganese ores in Cuba during 1918 amounts to an estimated total of 95,000 tons, as compared with 35,000 tons for 1917. The number of new properties opened up in 1918 was relatively small, although they yielded 40,000 tons in that year. Improved equipment resulted in adding 23,600 tons to the output of washed ores, formerly produced only by Aguilera & Co., Ponupo; and the only concentrating plant installed has placed the Cauto Mining Co. second in the list of producers, with about 12,000 tons shipped. Thus, the total of washed and concentrated ores now amounts to practically 75% of the total output. The importance of this method of treatment should become manifest to those interested in the future of manganese mining in this field. Although the average grade of the washed product has been 4% to 6% lower than that of the shipments of unwashed ores, the benefits to be derived by some form of treatment are obviously those due to the increased production and the corresponding reduction of costs below anything attainable by the smaller operators, who have felt that they could not afford new equipment.

In the purchase of manganese ores in Cuba in 1918 there was practically no competition. The Bethlehem Steel Co. absorbed the output of Aguilera & Co., and the Marshall-Keith interests handled most of the ore produced in scattered localities. Some producers tried direct shipment to consumers by the all-rail route, but the principal movement was by rail to Santiago de Cuba, and thence by ocean freight. A fair tonnage was moved through the port of Antilla, on the north coast, in the cases where that route offered economy in freight costs. Outside of the Province of Oriente, manganese production was negligible in 1918.

Uncertainty of market conditions for Cuban ores has been responsible for the crude methods of sampling and handling of the product. Much money has been spent in futile efforts to reconcile or readjust the discrepancies between the analytical results obtained by itinerant Spanish mining experts and enthusiastic Cuban druggists from samples of ore submitted by the sellers or would-be sellers, and those reported by the experienced chemists acting for the buyers. Probably the real trouble has been due to a complete disregard of the necessity for reducing ore particles to a size bearing a proper relation to the degree of reduction of the sample, without which it is difficult to secure an accurate mixture. Ore has been handled almost exclusively by shovels and wheelbarrows, operated by inefficient laborers. Practically no provisions have been made for sheltering stockpiles, with the result that much water has been shipped at a cost of about $18 per ton.

Future prospects for Cuban manganese depend upon market conditions and local coöperation. With the inevitable drop to a steady price per unit, approaching that of pre-war times, there seem to be but two ways of continuing the production of important tonnages of Cuban manganese ores. One is the complete control of the deposits by a single interest or groups of interests which would be in close touch with the principal consumers. The other is real, effective coöperation among the many Latin-American and peninsular owners and lessees of small and scattered deposits. The question as to whether such coöperation is feasible may be best answered by the operators themselves.

*Royal Bank of Canada, Santiago de Cuba, Oriente, Cuba.

Graphite in Ontario in 1918

By Thomas W. Gibson*

The production of refined graphite in Ontario for 1918 was 3022 tons, as against 3173 tons in 1917, valued at $210,018. Three companies were in operation: The Black Donald Graphite Co., at Calabogie, on the Kingston and Pembroke; the Globe Graphite Mining and Refining Co., at Port Elmsley, on the Rideau Canal, and the Timmins Graphite Co. which was engaged in building a mill and developing a new property on Lot 24 in the fifth concession of North Burgess Township.

The Black Donald mine is an important deposit situated on the shores of Whitefish Lake, and employed about 130 men. The refined products average about 25% flake and 75% intermediate and low grades known as foundry plumbago. At the Globe mine and mill 14 men were employed. The management carried on considerable experimenting with concentration methods during the year, and modified the processes in use so as to obtain a considerably larger recovery. The product is divided into large flake, small flake, and dust. On the property of the Timmins Graphite Co. a vein which varies in width from 25 to 27 ft., has been traced for about a mile and stripped for a short distance. The company has purchased 300 acres of land, and the mineral rights on 400 acres additional. The mill, which is 42 x 72 ft., with a capacity of 200 tons per day, is nearly completed, and the machinery is ready to be installed and is expected to be in operation by Feb. 1, 1919. About 50 men have been employed on the construction work.

Prices for flake graphite averaged from $140 to $320 per short ton, and plumbago sold for from $45 to $80. The demand for flake was dull throughout 1918. There was a fairly satisfactory call for plumbago until November, when business became flat, and it continued so until the end of the year.

Fluorspar

Fluorspar mining in 1918 was exceedingly active, new deposits in Arizona, New Mexico, and Colorado making production. The placing of an embargo, by the War Trade Board, on fluorspar importations, together with the rise in prices and increased demand, greatly stimulated domestic production. The domestic production of 1917 was 218,828 short tons, according to the U. S. Geological Survey, and the production for 1918 probably exceeded that figure.

In 1917, high transportation costs prevented Colorado producers from competing with those of Missouri, Illinois, and Kentucky. Shortage of freight cars during 1918 enabled Colorado producers to supply the local demand, the largest consumer being the Colorado Fuel and Iron Co., at Pueblo. Other Western demands were met by producers of Yuma County, Ariz., and from deposits in New Mexico. In Colorado, the principal producers are the American Fluorspar Mining Co., at

*Deputy Minister of Mines for Ontario, Toronto, Canada.

Wagon Wheel Gap, making a production of 50 tons per day, and the National Ore and Metals Co., of Boulder, making a production of 1000 tons per month. Other deposits are at present being mined in Custer and Jefferson counties.

The price of Colorado fluorspar was $22 per long ton, f.o.b. point of shipment, late in 1918. Canada made a small production. The Consolidated Mining and Smelting Co., of Canada, after acquiring a promising British Columbia fluorspar deposit, made tests in the manufacture of hydrofluosilicic acid, with such satisfactory results that it is proceeding to open the deposit on an extensive scale. By the beginning of January, 1919, the company, which already has forwarded several carloads to New York and Philadelphia, expects to be able to begin regular shipments at the rate of from 1200 to 2000 tons per month. To facilitate this an aërial tramway is being constructed for a distance of several miles from the mine to the railway. Thus, the local requirements, which before had to be provided for by shipments from Kentucky, will be cared for, and there will be sufficient surplus to permit the shipment of considerable quantities.

Commercial Grades and Requirements

Fluorspar is placed upon the market in three grades, lump, gravel, and ground. The silica limit for lump and gravel spar is 6%; for spar to be used in the ceramic industry, 3 to 5%, and for spar to be used in the production of hydrofluoric acid, 1%. Lead or zinc compounds are objectionable to ceramic manufacturers, and an excess of 1% calcium carbonate is objectionable to acid makers. Standard specifications for metallurgical fluorspar require that the mineral contain not less than 85% CaF_2 and not more than 5% silica.

Prices during 1918 were erratic, but $25 per long ton would represent the average price for fluxing grade and $40 for ground fluorspar. According to *Mineral Industry* the 1917 prices were: gravel, $9.61; lump, $13.68; ground, $17.59; all grades $10.45 per ton.

The demand for fluorspar is principally for metallurgical purposes in the basic openhearth steel process. There is an increasing use in electric furnace plants and in the electrometallurgical industry. In the chemical industry there is an increasing demand for the higher-grade fluorspars. The demand for optical fluorite is limited, but will increase if sufficient quantities could be produced at reasonable prices. Only perfect crystals are suitable for optical use. The value of optical fluorite is approximately $1 per lb., though large, fine specimens may bring $10 apiece.

The Zinc Problem in Italy*

After reviewing the various processes of zinc production, it is necessary to take into account the special conditions for a production of this metal in Italy, where zinc ores are plentiful.

Coal-Fired Retorts—Fuel consumption in the most improved furnaces is about one ton of good coal in the generators for each ton of ore distilled. Furthermore, it is necessary to mix the mineral with about 40% of clean reducing coal. Extraction of spelter is less than 90%, and consequently, taking 40% as the average of zinc concentrates in Italy, three tons of ore, three tons of heating coal and 1.2 tons of reducing coal are required for the production of one ton of spelter. The consumption of retorts and condensers is also to be taken into account, this item being not less than half a ton for each ton of spelter. These data correspond to what can be obtained only under excellent operating conditions and with the employment of skilled labor. Four tons of fuel and half a ton of refractory material per ton of spelter must be reckoned as a conservative estimate.

The capital investment in such a plant, according to foreign experience, is figured at $200,000 per 1000 tons of spelter per annum. This industry would not be remunerative in Italy without a high protective tariff, to compensate the producer for the higher cost of coal and refractories.

Thermo-electric Process—Consumption of energy for the distillation of one ton of zinc from medium-grade concentrates is estimated at 5000 kw.-hr. The consumption of electrodes and of lining material for the furnace has also to be taken into consideration. In Swedish plants, where the process is considerably developed, the cost of current per kilowatt-hour is about half a centime (0.005) a figure that cannot be reached in Italy. This method also could not thrive there without an adequate protective tariff.

Electrolytic Process—This process cannot be generally applied to all classes of ores. Those with calcareous-dolomitic gangue, such as the Sardinian calamines, are not suitable for electrolysis, on account of the reaction between solvent and gangue. Blende too high in iron does not give good results, and its treatment offers special industrial problems. Only blende with siliceous gangue, low in iron, is treated in America. Italy produces—or rather could produce—in Piedmont as well as Sardinia, blende similar to what is treated in America, and the quantity would be sufficient to supply more than the normal requirement of spelter in the kingdom. It is therefore to be hoped that all Italian blende may be treated electrolytically in Italy.

The consumption of energy for the production of one ton of electrolytic zinc is estimated at 4000 kw.-hr. It is stated in America that 1 hp.-year corresponds to the output of 1 ton-year, this figure including also the requirements in other steps of the process, including grinding of concentrates and purifying of electrolytes. The capital required for the erection of such a plant is considerably higher than for the erection of coal-fired retorts. According to estimates recently drawn for the erection of such a plant in Italy, it appears that the cost would be about three times greater than in the case of coal-fired plants.

*Excerpt from a paper by Erminio Ferraris, entitled, "La Metallurgia dello Zinco," published in *L'Industria*, Vol. 32, No. 10, 1918.

Limonite at Alta Lake, B. C.

The deposit of limonite at Alta Lake, British Columbia, which is being developed to supply fluxing material for the smeltery at Irondale, Wash., according to Charles Camsell of the British Columbia Department of Mines, covers an area of 60,000 sq.ft. Analysis has shown 40.98% Fe; 0.2 to 1.80% S; 0.1 to 1.88% P; and 1.24 to 2.2% SiO_2. Other small deposits of similar ore occur in the neighborhood, originating from the decomposition of pyrite-bearing rocks.

Correspondence and Discussion

Replacing Oliver-Filter Shafts

Under "Details of Milling and Smelting" in the *Journal* of Nov. 9, Algernon Del Mar presents a sketch illustrating a method of overcoming the difficulties of re-aligning and removing agitator shafts in the Oliver filter. Inasmuch as Mr. Del Mar has kindly offered this information as a result of my suggestion as to this difficulty, an additional word of information may be of value. If Mr. Del Mar is not mistaken as to the origin of this particular type of shaft, it has already been adopted by the manufacturers. The section as drawn is identical with that of the shafts installed in the Oliver filters over 8 x 8 ft. in size. It is also the same shaft referred to in my article of Aug. 3.

As suggested by him, the short inserts will easily pass through the packing glands after removal of the pins; but it will be observed that the larger section made up of extra heavy pipe can only be removed over the top of the tank, even after taking off the paddles. If, therefore, this part becomes defective, as it did in the case described, there is only the one remedy. I am informed that the Oliver Filter Co. is providing a hand hole in the ends of its newer machines, which is large enough to take care of the entire shaft and overcomes this troublesome feature. F. DEAN BRADLEY.

Pittsburg, Calif., Nov. 30, 1918.

About Spanish

A great deal of piffle is written about Spanish, its importance, and the necessity for its study in schools and colleges. Like Mr. Finlay, I shall begin with a few axioms, and though they may not be so self-evident as his are, they can, nevertheless, be proved, and I am here to do it.

My first axiom is that Spanish is unimportant. The important South Americans speak or at least understand English, and it is not worth while to learn Spanish for the others.

No one can say in Spanish "standard gage," or "standard pipe," or "standard rails," and no language can be important in the commercial and manufacturing world which lacks these phrases. A thing which partly offsets this is the fact that, although the idea of standard is missing, the standard articles themselves are used, quite impartially—all of them. One finds six or seven standard railway gages, four standard pipe threads and a dozen standard rail sections.

My second axiom is that there is no necessity for the study of Spanish in schools and colleges. Many engineers studied Spanish in the university by reading Don Quixote (skipping the worst parts), and though it was interesting and exciting, it was a waste of energy. In one instance, of an entire class of 90 students, only one can now speak Spanish, and he learned this long after reading Don Quixote.

The Mayor of Boston has written a whole column in the *Evening Post* in which he proves that not only Spanish, but also Portuguese, should be taught in all public schools and colleges. Poor little children! What have we done to merit such punishment as this? (He also thinks that we children should study the metric system.) Another contributor suggests the slight addition of Dano-Norwegian, Dutch, Chinese, Japanese, Russian, and Italian, with, of course, French. Sure! He thinks a good scheme would be to teach mathematics in French and geography in Spanish. Quite so!

Another axiom: No one ever learned to speak Spanish in the grammar school or college. He may tell you that he did, but if you will dig deep, you will find that he spent a year or two in Mexico or South America or Spain. What he learned of Spanish at school or college is negligible.

Another axiom: Few persons have any possible use for Spanish. There is the office man who writes the letters and translates the bills of lading for the consular invoice. No American can learn Spanish enough to do this in *correct* Spanish. This man gets $18 per week. If he knows three languages his salary is $17.

Then there is the captain of the Emergency Fleet steamer. If he is like his British brother, he will know about eight words, and I positively decline to say what they are.

Then there is the waiter in the hotel. At least one waiter in every first-class hotel should speak Spanish, because in the hotels here there are occasional visitors who speak that language, and in the hotels in South America many do. This waiter is usually foreign born, so that we American boys and girls who are being trained for this profession need not know Spanish.

We have last, then, only the traveling salesman and the traveling buyer. The former requires a few words at table and in getting his baggage ashore, but if he uses their English equivalent vigorously the results are equally good.

In engineering lines, everybody in South America, of course, speaks English, because most of those who amount to anything in engineering have been educated abroad. Many are English or of English descent.

In agriculture, there are no traveling salesmen.

Most of the shoes are made locally, and the shoe machinery salesman (he is still there, I believe) considered Spanish to be convenient but not necessary.

In selling drygoods, it is advisable to know a few words of Spanish, though all the houses have English-speaking officers. Whatever Spanish is desired can be learned in a few hours a day on the steamer, before you reach the first place where there is a store.

I knew the manager of a huge copper mine who did not know enough Spanish to say "tomorrow," yet he was the best who ever held the position, and was entirely successful in meeting the wishes of the local government. But this manager certainly knew men and mines.

I know an Englishman, manager of a nitrate plant, who speaks Spanish in a way to make one hate the whole human race—yet he has no strikes and his company pays dividends. He says he has been on the pampas 10 years, and the bloody Chileans have not learned English yet!

There is a representative of a well-known American manufacturer in South America. He has been there for several years. He is a young man, and is fond of the Chilean girls, and tries to talk to them. They pretend to understand, though I have been asked confidentially to translate his Spanish. But how that boy can sell his line! If I told what his line was, you would recognize him. He certainly knows his business, and think what a pity it would have been if he had waited to learn Spanish before learning his business!

There is a buyer of casings in the Argentine. He invariably salutes his customers with *"Bonus dias, senor"* (without the ñ, which he considers an affectation), but he could buy casing if he was deaf and dumb. He knew all about casings before he knew where the Argentine was—probably learning about casings while his present competitors were studying Spanish in college.

A friend of my father writes all the copy for a weekly market letter in Spanish. A poor thing, but all his own. The Spanish is not the "pure Castilian" which is studied at college, but rather a Spanish with a piquancy (and sometimes a construction) quite unique.

One Spanish subscriber wrote him, "I am not interested in metals or engineering or the market, but I have seen one copy of your *Revista* and simply must see every issue, though five dollars is a good deal of money to me. I am of a melancholy disposition, and your Spanish affords me great relief." Nevertheless—and this is the point of the whole story—because it offers something of value, his readers *pay* for it, and they will pay *your* salesman for *your* products, whatever his Spanish may be, provided he knows his business.

The *Commerce Reports* of Oct. 5 has an excellent article by C. D. Snow on "Foreign Languages in England and the United States."

Spanish is useful, but not nearly so important as it would appear. Briefly, all the correspondence and office routine *must* be done by those with whom the language is mother-tongue. The salesman must know his business first, last and all the time, and should be chosen on these grounds *alone*. If he is one of the best salesmen in your organization, he will be bright enough to pick up enough Spanish for his business needs.

To produce the hundred or two hundred salesmen who are traveling in Spanish-speaking countries, it is nothing short of a crime to make millions of us children waste time studying *at* Spanish, but never learning it.

GEORGE WASHINGTON.
(Aged 10 years)

New York, Dec. 1, 1918.

Grouting in Mine Shafts

I was much interested in the article "The Cementation Process in Mining." by A. H. Krynauw, which appeared in the *Journal* of Dec. 7, 1918. In the United States this process is called grouting, and is extensively employed in shafts or tunnels having a concrete lining. In this country, however, the cement or grout is usually forced into the rock by compressed air. A pump handling grout must give constant trouble, owing to the setting of the cement. Cement sets with annoying rapidity under pressure, frequently clogging the valves.

The method outlined for shutting off water in shafts where the lining is not strong enough to stand high pressure sounds very simple, but in practice it is a long and tedious process. The water must be kept away from the concrete, as it is being poured, before placing the lining. This is done by means of thin steel plates, called pans, placed against the rock. These, in turn, are pierced by enough pipes to allow the water to flow through them freely without damming back. Each "weep" hole should have another hole above it to relieve the pressure. The pipes must be threaded so that a stop cock and connections from the grout machine can be screwed on.

Grouting should be started at the lowest hole when the concrete has sufficiently set. The stop cock is opened and grout forced in until the space between the pan and the rock is completely filled. This must be done at about 100 lb. per sq.in., to avoid putting too much pressure on the lining, as the pressure acts on the entire area that has been "panned" off. Care must be taken to keep the vent holes open so that no air will be imprisoned, and so prevent the complete filling of all adjacent holes. When grout begins to come from the vent holes, or no more can be forced into the hole that is being grouted, the stop cock is closed and the machine moved up to the next ring of holes. As the grouting proceeds up the shaft, there comes a time when it reaches the top of the water, and the water is therefore shut off. This, however, will not invariably give a dry shaft. As the water pressure increases, the water will seep through the lining, sometimes in considerable quantity. The grouting process must be repeated several times.

In the final stage the "weep" holes are drilled out and the drilling is continued deeply into the rock. It may also be necessary to drill additional holes through the lining. Grouting is then resumed at high pressure, 200 to 300 lb. per sq.in., as the water pressure must now be overcome, and the further the grout can be driven into the cracks of the rock the dryer the shaft will be. The idea is to drive the water away from the lining altogether, and here is where the trouble begins. The watercourse may not be deep in the rock, as described in Mr. Krynauw's article, but may be adjacent to the lining, in which case the pressure, instead of being exerted on the rock, will come on the lining, and a cracked lining or a blown-out section will result.

A lining which cracks or otherwise shows signs of weakness is not always hopeless. Sometimes such sections must be cut out and a stronger lining put in, or they may be strengthened by careful grouting until they will stand as much pressure as the remaining sections.

A little sand will often be found beneficial in closing cracks, but it cannot be used where the cracks are very fine, as the sand will not penetrate where the grout alone will. Sand is also beneficial in filling large holes, such as are found in limestone. Large cracks should first be closed with pine wedges, as described by Mr. Krynauw. For very fine cracks the pressure should be such that grout is forced through the crevices, which should then be carefully caulked with lead wool, and the cement given time to set.

A. K. FRIEDRICH,
Shaft Inspector, Buckeye Coal Co.

Nemacolin, Greene County, Penn., Dec. 14, 1918.

Labor and Reconstruction

J. Parke Channing's address at the Reconstruction Conference at Atlantic City on Dec. 4th, which appeared in the Dec. 14 issue of the *Journal*, was particularly timely, pertaining, as it does, not only to mining but to all classes of industry. There can be no doubt that reciprocity on the part of labor is needed to solve the industrial problem. Many employers know this, and the rest will learn it before long. Many laborers do not know it: they neither realize the necessity of it nor know how to reciprocate. The problem of instructing labor in this direction is the difficult task that employers have before them.

This education cannot be given through books or lectures; indeed, it is more a question of alteration of character than education in its commonly accepted significance. It cannot be acquired by the laborer in a short time. It means years of careful handling—the changing of men from ten-day miners to thrifty residents of a permanent, progressive community. It means the careful handling of the younger generation, particularly between the ages of 12 and 25, during the period of character formation. The Bunker Hill & Sullivan Co. has been working along these lines for the last 18 years. The Phelps Dodge Corporation is doing excellent work, and many other younger organizations have started movements in that direction.

Though, as Mr. Channing states, there may have been some ill-advised remarks respecting the reduction of wages and the increase of hours, it is questionable if his statement that there is nothing to justify predictions of such a character is not a little too optimistic. If by wages he refers to the gross amount of money received, he is wrong. There are tangible reasons for believing that these will fall in the course of readjustment. If by wages he means the net return above cost of normal existence, he is more likely to be right, and there is every reason to hope that this will be maintained. The compensation which is represented by those things that make life worth while, a family and a comfortable home, some sane recreation, some wholesome diversion from the monotonies of the work-day life—these are the wages that we would like to see maintained, but, as stated above, labor is not yet prepared to do its part in coöperating. Years must pass before this is possible; and wages will fall in the meantime.

With the normal demand for food in Europe and a shortage in supply which, for the present, must be made up by the United States, there is no immediate prospect of a reduction in the cost of living. For a short time we may be called upon to furnish Europe with even more than we have been sending across the Atlantic recently, but sooner or later Europe will produce again; and, as more shipping becomes available, food will go forward from Australia and South America to relieve the demands on our home markets. The production of wheat in the United States for 1919 promises to create a record. There is also an abundance of grain now awaiting shipment from Australia, and food prices are bound to come down before long.

Assuming that industry will remain practically constant in its activities, and that the demand for labor will hold constant also, wages might be expected to remain constant, and a fall in the price of food would then be equivalent to a rise in wages, and there would certainly be a net gain to the worker. Presuming that industry does not remain constant and that the demand for labor diminishes, as we know that it is diminishing in some lines already, then this surplus labor must find work somewhere; and, if it cannot get it where the demand at high wages exists, it will get it where industry is reviving on a lower scale. Falling food prices will then enable labor to accept the lower gross wages without sacrificing its advantages in net wages.

I hope that in new industrial lines there will be a demand for all the labor that has recently been employed in war work, and that the demand will keep up the standard of wages, but there are reasons to fear that during a period of readjustment a good many men will be looking for employment. The daily press is now reporting that thousands and tens of thousands of men throughout the Central West lack employment. If these reports are correct, then the law of supply and demand will take its normal course, and both prices and wages will fall, in spite of all that will be done in the way of reciprocity.

If one examines the index numbers of commodities for the last century, it will be observed that, coincident with every war of importance, these figures have risen; and, following the declaration of peace, they have gradually fallen again. This war has been different from all other wars in the amount of damage that has been done and in the extent of replacement that must be made when peace is declared, but though this is true it is also true that the world is now better equipped to make good the destruction than it has ever been before. On the whole, the war has been much the same as other wars, except that it was conducted on a magnified scale, and economic conditions may be expected to follow the same sequence as in the past. It is hard to believe that commodity prices and labor will not, if left to take care of themselves, follow the same path that they have in other post-bellum days.

Hence, more than ever should the industry strive for what Mr. Channing advocates—reciprocity on the part of labor—with the hope that it may lose none of its advantages, and that the capital upon which it depends for a living may not be destroyed. F. F. SHARPLESS.

New York, Dec. 31 1918.

Reconstruction Suggestion From Mexico

It would seem to some of us down here that if there was less talk about maintaining high wages, and the President would declare Mar. 17 as "Reconstruction Day," at the same time recommending that the prices of all articles which have risen perceptibly since the beginning of the war be cut, say, 10% on that day, and, furthermore, that everyone receiving high wages brought about by the world war should consent to a cut of 10%, a more healthy situation could be created all around and ultimate good brought to all of the people in the United States. It would give every nationality a chance to show what it is made of.

If employers find that they can secure men for less wages, they may employ more, and thus relieve the situation to some extent. H. C. E.

San Luis Potosí, Mexico, Jan. 8, 1919.

Industrial News from Washington

By Paul Wooton, Special Correspondent

War-Minerals Relief Bill Altered

After conferring with the Secretary of the Interior, Senator Henderson, of Nevada, has decided to reintroduce his bill for the relief of producers of war minerals as an amendment to the Dent bill. The text has been altered by inserting, after the sentence authorizing the Secretary of the Interior to determine the amount invested looking to the production of war minerals, the following: "The production of which was in pursuance of a request or demand of the War Industries Board, the Shipping Board, the Department of the Interior, or other authorized agency of the Government."

At the close of Section 1 of the old bill, a proviso is inserted as follows: "Provided, however, that the said Secretary shall only ascertain and determine and liquidate such claims arising hereunder as shall have been made and filed with the Department of the Interior on or before three months from and after the approval of this act."

Redfield Takes Conservation Work

The conservation division of the War Industries Board has been taken over by the Department of Commerce. It now will be known as the Industrial Cooperation Service. Conservation of labor, material and capital, through studies of individual industries, will be the object which it is hoped to attain. Secretary Redfield, however, emphasizes the fact that no element of compulsion is to enter into the relation of the service with the industries. "The service," he says, "is promotive purely, depending on consent to methods approved by common council and trade experience. In no sense is it restrictive and in no sense is it a police body." Continuing, Secretary Redfield said further:

If some particular industry should desire to put into effect within itself such a program as would enable it to simplify manufacturing processes and to eliminate such of its product as was wasteful of material and labor tending to increase general costs of production, such a program would be considered by the Service in conference with members of the industry. If the plan seemed wise and reasonable, it would be indorsed by the Service. It must be understood clearly that the administration of the program, if administration be necessary, lies within the industry itself. It will be impossible to carry this work any further than the spirit of industry itself will carry it.

Seeking Storage for Nitrate of Soda

The War Department is finding considerable difficulty in obtaining storage for its surplus of nitrate of soda. The railroads are lending aid and have agreed to find storage for 153,619 tons at the following points: Galveston, 8500 tons; New Orleans, 5000 tons; Mobile, 21,645 tons; Pensacola, 10,560 tons; Tampa, 6500 tons; Jacksonville, 27,237 tons; Fernandina, 4000 tons; Brunswick, 15,744 tons; Savannah, 36,433 tons; and Wilmington, 18,000 tons. In addition, the War Department has had to contract for expensive space, and a large number of commercial dealers have accepted nitrates for storage.

Engineers To Visit France

A delegation from the U. S. Bureau of Mines will visit France to make a study of the engineering work being done in the recovery of the mines systematically damaged by the Germans. The body will be headed by George S. Rice. The other members are F. G. Cottrell and F. H. Probert. The delegation will sail early in February, to remain in France for three months or possibly for a longer period.

Pyrites May Be Imported Freely

All restrictions upon the importation of iron pyrites were removed as of Jan. 16 by the War Trade Board. In addition, the restrictions have been removed from graphite, graphite crucibles, iron ore, chrome ore, chromite, manganese ore, manganese dioxide, copper ore, copper concentrates, and monazite sand. Licenses will be issued for the importation of ferromanganese from Great Britain to cover shipments which were contracted for by American consumers prior to Apr. 6, 1917. It this case, the affidavit of the importer or a written statement from the consumer of the existence of the contract will be considered sufficient evidence.

The order with regard to iron ore supersedes the order of Nov. 11 affecting low-phosphorus iron ore from Spain, Sweden, Norway, and North Africa, and the order of Dec. 7, affecting calcined spathic iron ore originating in and coming from England.

Urges International Commissions

Permanent international commissions to handle problems concerning raw materials, food, and other questions are being urged by William S. Culbertson, of the U. S. Tariff Commission. He outlines his views as follows:

In the world out of which the Great War sprang as inevitably as sparks fly upward, a nation aggrieved by shipping, trade, or financial discriminations had only the alternative before it of submitting or retaliating. If it submitted, it nursed its grievance into suspicion and hatred; if it retaliated, the world witnessed a commercial war which increased ill feeling. The need was great, and now, after the war, is even greater for international commissions which will investigate and offer a solution to these commercial rivalries before they result in conflict. The Allied Maritime Transport Council, which has rendered such genuine service during the war, suggests the field for an international shipping commission. The food and raw material executives of the Allies may be regarded as the beginnings of the organization for handling world problems concerning food and raw materials. Anarchy, before the war, reigned almost supreme in international trade relations. Because there were no international standards of competition, the only restraints on unfair practices by great export syndicates were those exercised by nations, and they were ineffective. An international trade commission could be of great service in making competition between nations fair. Investments and concessions in politically backward countries should also be under an advisory commission, which would view the problem in the light of international needs. An international tariff commission, as the discussions in this address indicate, is imperative. It would act as an arbiter in tariff disputes between nations, give publicity to concealed discriminations, investigate and report on the economic phases of any exceptions to the general rule of equality of treatment and opportunity, and at stated times submit, as should the other international commissions, its reports and findings to the reassembled delegates of the nations.

Seek To Establish Potash Industry

WASHINGTON CORRESPONDENCE

A determined attempt is being made to secure legislation favorable to the development of a domestic potash industry. Producers have been in conference with the potash specialists of the U. S. Bureau of Mines and have been able to find some support for legislation to provide that no potash is to be imported without a license showing, among other things, the exact quantity brought into the country. The total imports are not to exceed the difference between domestic production and domestic requirements. It also is suggested that a potash corporation be formed to purchase and sell potash with the object of assisting the industry by carrying such surpluses of stock as will be required. Another function of the company would be to carry on its experimental work with processes which give promise of developing to a commercial basis. The idea is to limit such legislation to a period of a few years.

It is expected that a bill will be evolved in the near future which will meet the approval of the Secretary of the Interior. The foregoing proposals, along with others, have been submitted to Secretary Lane, but as yet he has given none of them his approval.

The Annual Meeting of the A. I. M. E.

International coöperation in mining in North America will be one of the principal topics to be discussed at the 119th meeting of the American Institute of Mining Engineers, to be held in New York, Feb. 17 to 20. In the course of the convention two joint sessions with the Canadian Mining Institute and one joint session with the American Institute of Electrical Engineers will be held. A number of prominent members of the Canadian Institute will be present.

Improving the relations of capital and labor and the possibility of a uniform mining law for North America will be among the principal subjects which the Canadian engineers will discuss with the American Institute. Many of these topics will deal with after-the-war problems of great significance to American business. Three of the four days of the convention will be devoted to business and technical sessions, with entertainment features in the evenings, and the fourth day will be given over to an excursion to the Federal shipyard at Newark Bay, where an electrically welded ship is being built. The subject of electric welding is one of the principal topics to be taken up by the American Institute of Electrical Engineers in joint session with the mining engineers on Wednesday, Feb. 19.

The social features of this year's meetings will include an evening entertainment, a visit to the Metropolitan Museum of Art and Senator Clark's art galleries, a matinee, the reception of the president, and the annual banquet.

The committees in charge include the following:

Arrangements, Allen H. Rogers, chairman; W. S. Dickson, secretary; J. E. Johnson, Jr.; F. T. Rubidge, P. G. Spilsbury, H. C. Parmelee and Forest Rutherford. Committee on annual dinner, F. T. Rubidge and E. B. Sturgis. Committee on luncheon, Forest Rutherford, chairman, and E. Maltby Shipp. Committee on patriotic meetings, H. C. Parmelee, chairman.

Would License Patents

WASHINGTON CORRESPONDENCE

A bill has been introduced in the Senate authorizing the Federal Trade Commission to handle inventions, patents, and patent rights under a licensing system with the idea of being helpful to industry and to the inventors or patentees. Special mention is made in the bill of patents obtained on processes devised by employes of the Government. Provision is made for financial remuneration of those developing meritorious investions.

Perkin Medal Goes to Doctor Cottrell

Dr. Frederick Gardner Cottrell, chief metallurgist of the U. S. Bureau of Mines, was presented with the Perkin medal for chemical discovery by the Society of Chemical Industry at the Chemists' Club, New York, on Jan. 17. The American Chemical Society and the American Electrochemical Society concurred in the decision.

The work of Doctor Cottrell was selected for this honor, says the New York *Sun*, because it is judged to have an important bearing on the development of industry. Doctor Cottrell invented a precipitation process by means of which soot and particles of metals and chemicals are eliminated from smoke before it is discharged into the air. Through its use the noxious and acid fumes from copper smelteries may be kept from vitiating the atmosphere and destroying vegetable and animal life, and valuable metals may be reclaimed.

Doctor Cottrell, in accepting the medal, announced a new process for extracting the gas helium from the atmosphere, which is expected to have a tremendous effect upon aërial navigation. This gas is very buoyant and non-inflammable. Its production was once so expensive that it was regarded as a laboratory experiment, but in the stress of war two processes for developing it cheaply have been found, and Doctor Cottrell's method produces it still more cheaply.

The Perkin medal is named after Sir William Henry Perkin, who discovered the first aniline dye and to whom it was first awarded. Aniline dyes were first developed in England, it was pointed out, thus shattering another popular German myth.

Sweden To Receive Metals

WASHINGTON CORRESPONDENCE

Provisions have been made by the War Trade Board which permit the exportation to Sweden of lead, aluminum, nickel, mica, graphite, metals not worked, crucibles, tin plate, and similar commodities when consigned to the Swedish Metal Import Association. The Swedish Raw Phosphate Import Association will likewise receive phosphates, and the Chemical Industries Import Association will receive sulphur, technical oils, stone rosin, and like materials.

A Large Over-Production of Pig Iron, Chrome Ore, spiegel and ferromanganese faces the iron and steel men of America with a possible lowering of the prices of these products. At a meeting of the Associated Manufacturers of Merchant Pig Iron and the American Association of Pig Iron Manufacturers, the two associations of American producers, this phase of the iron industry was discussed.

Mining and Metallurgical Society

The Mining and Metallurgical Society of America held its annual meeting at the Engineers' Club in New York, on Jan. 14, at which the reports of the officers for the previous year were made.

The tellers reported the result of the ballot for officers for 1919, and the following were declared elected: President, H. H. Knox; vice-president, F. F. Sharpless; secretary and treasurer, Louis D. Huntoon. The following were elected to the Council: W. R. Ingalls, Walter H. Aldridge, J. E. Spurr, Ralph Arnold, and C. W. Goodale.

At the evening session, following the annual dinner, which was attended by about 60 members and their guests, the award of the gold medal of the society to Eugene Schneider, head of the Creusot Works in France, for distinguished service in the metallurgy of iron and steel, was announced. The presentation of this medal will take place later.

The retiring president, W. R. Ingalls, then delivered an address on "The Economic Duties of the Engineer," which was followed by a supplementary address by the incoming president, H. H. Knox.

The meeting was one of the most successful in the history of the society.

Penarroya's New Lead Plant

Bradley, Bruff & Labarthe, San Francisco, have been retained as engineers by the Société Minière et Métallurgique de Penarroya, for the design of a new lead smeltery and refinery to be erected at Penarroya, in Spain. The plant will be thoroughly modern in every way, and special attention will be directed toward the mechanical handling of materials. Manual labor will be dispensed with as far as practicable in the operation of an establishment of this kind. Crushing and sampling machinery, multiple-hearth and Dwight & Lloyd roasting and sintering equipment, four large lead blast furnaces, one copper blast furnace, a lead-copper matte converting plant, complete zinc and desilvering lead refinery, together with lead manufacturing machinery will be provided. The roasting and metallurgical furnaces will be fired with pulverized coal.

"Jack" Clynes

Herbert N. Casson writes in the *Boston News Bureau* that the coming man in Great Britain is John R. Clynes —the ablest labor leader in that country. Clynes is a member of the new Parliament. He was reëlected unopposed. No one dared to run against him. He has been for two years a member of the government. He is the food controller. He is a delegate to the peace conference. He will be the strongest man in the labor party, and may on critical occasions hold the balance of power in the new House of Commons. He is Gompers, Hoover, and Champ Clark all in one. He is in many ways the most influential and pivotal man in British public life.

Clynes is a friend of Lloyd George, but not a follower. He is, above all, the head of the national federation of laborers' unions—a powerful body of 750,000 workers. He is a fighter without enemies—a thinker without theories—a practical, simple, efficient son of Lancashire.

"Jack" Clynes was a child of poverty. He has never had an asset nor an advantage except himself. He was born in 1869—the son of a laborer at Oldham. As there are 13,000,000 spindles in Oldham—more than in Germany and Austria combined—all the small children are needed in the factories; and Jack Clynes went to work at 10 years of age. He was a tiny, frail, shock-headed boy—probably the most insignificant industrial unit in the whole of Lancashire. But he was fond of books—as fond as ever Andrew Carnegie was. He begged, borrowed, and bought as many books as he could. Once he was discharged by a mill manager because he was caught studying a grammar during working hours. At 18 he bought a second-hand dictionary and copied it all out, from A to Z. His favorite book was the Bible; his favorite authors were Carlyle, Mill, and Shakespeare. At 22 he was an orator and a labor leader. He took command of a small, despised trade union and built it up to a membership of 40,000 and an income of $100,000 a year.

There is no class hatred in Clynes. He has no more regard for the I. W. W. than he has for the House of Lords—not as much, in fact, as he has several lords working amicably as his assistants in the food-control department. He is in favor of more machinery and more output. "Anything that machinery can do," he said recently, "to save human hands and to speed up production, should be done." He believes that capitalists and workers are natural friends and that both are becoming more reasonable. He is not in any sense an extremist, yet at the last labor convention he was the most popular of all the delegates and received the highest number of votes.

A man who has this engaging record is bound to excite admiration. A labor leader who wants to mechanicalize everything and speed up production is a wonder. We think we are justified in claiming "Jack" Clynes as an engineer.

Spain's Mineral Output in 1917

According to preliminary statistics just issued, says *Commerce Reports* of Jan. 3, the total value of Spanish mineral products for 1917 was $245,383,732, an increase compared with 1916 of $72,193,244. The value of ores at the pit amounted to $87,923,572, and the value of the mineral products from the smelting works was $157,460,160. The number of concessions in actual operation was 2839, with a superficial area of about 1150 square miles, an increase of 308 concessions and about 63 square miles compared with the year 1916.

Foreign Mining

The administrators of the Compagnie des Mines de Bor have visited the mine in Serbia and have taken steps to estimate the ore that was extracted during the German occupation. The physical condition of the mine was found to be satisfactory, the machinery, furnaces, and other equipment proving to be intact.

The Compagnie Miniere du Congo in its last year, in spite of difficulties, extracted 15,000 tons of ore, averaging 50% copper.

Premier Hughes on Australian Mining

In the *Journal* of June 15, 1918, Premier Hughes of Australia was reported as having made a speech before the Harvard Club in New York, in which he was quoted as saying that the mines of Australia "were entirely under the control of German capital when the war came," and, further, that "to be fair, the German energy and capital were very beneficial to us."

We are in recipt of a communication from the private secretary of the Australian Prime Minister, stating that he "did not address the Harvard Club, New York, and on no occasion while in America or elsewhere has the the Prime Minister given utterance to the statements expressed by you. What he is reported to have said is quite opposed to every view he has ever expressed, and most certainly in direct opposition to all the facts, of which he has complete knowledge. Under the circumstances Mr. Hughes will be glad if you will take an early opportunity of contradicting the report referred to."

We are glad to make the necessary contradiction, not only to correct a misrepresentation of Mr. Hughes, but also to rectify an error in our record of events. It is appropriate to explain, however, how the error occurred.

Our paragraph was taken from the news reports of the day, similar reports appearing in the chief New York morning papers of June 2, 1918. Reference to such contemporaneous evidence causes it to appear that Mr. Hughes did not make a speech before the club, but did talk to representatives of the newspapers in the Harvard Club on June 1. The reporters manifestly misunderstood his remarks. It is possible that Mr. Hughes mentioned the trade in certain Australian ores being controlled by German houses, and the reporters may have misunderstood that to mean the mines being controlled, which, of course, was not so, as Mr. F. A. Govett stated in a communication published in the *Journal* of Sept. 7, 1918.

Of course, the alleged statement was contrary to the facts, which nobody knew any better than ourselves, which facts we have stated editorially many times since August, 1914. We regret that the paragraph published in our issue of June 15 did not pass under the eye of an editor who was familiar with the subject.

Villa Financed by Germans*

The Senate committee which is investigating German propaganda developed an interesting point at its session of Jan. 7. Strong evidence was submitted tending to show that the Villa uprisings of 1915 were financed by Bernstorff and Albert. Drafts drawn on the Mississippi Valley Trust Co. by Felix Somerfield, who was Villa's agent in New York, show that, in eight months, Villa received $367,000 worth of rifle cartridges from his agent. Somerfield was closely connected at that time with Carl Rintelen and Friedrich Stallforth, a prominent German banker in Mexico. Though positive evidence is still lacking that the Somerfield account was fed by Bernstorff, it is a fact that on Apr. 5, 1915, Bernstorff and Albert opened a joint account with the Mississippi company, and on the same day Somerfield opened his account there also. The ammunition sent to Villa was made by the Western Cartridge Co., of Alton, Ill., was paid for by the sight drafts on Somerfield, and shipped to Hippolito Villa at El Paso. Hippolito is a brother of Francisco Villa, the bandit. Major Humes, who submitted these facts, pointed out that the Somerfield account was kept replenished by telegraphic transfers from the Guarantee Trust Co. of New York. The Bernstorff and Albert accounts and the Somerfield account with the trust company were closed at about the same time. Though positive proof is still lacking, the evidence points to the conclusion that Villa was financed by Germany during this period.

*Extract from article in New York *Times*, Jan. 8, 1919.

A Useful Hint for Mining Men

One way of injecting new life into an old subject is to send in a perfectly new contribution to the 27th Engineers' Comfort Fund. Of course it is needed, with the regiment still on the other side, and once it is given the donor will scarcely feel it. At any rate, he may know that whatever sacrifice he has made in giving it is appreciated by the men of the regiment. We have Colonel Perry's word for this in a recent letter. Many have overlooked the matter. These, especially, are urged to help boost this fund for our mining regiment.

HOW THE COMFORT FUND STANDS

Previously acknowledged	$19,653.56
W. E. Defty	10.00
Alaska Mining and Engineering Society	111.00
W. H. Corbould	6.50
Dover Laboratory	2.00
Interest to Jan. 1, 1919	105.30
Total	$19,888.36

Checks should be made payable to W. R. Ingalls, treasurer of the Association of the 27th Engineers.

Silver and Zinc in Eastern Siberia

Years ago large and important deposits of lead, zinc, silver, and other minerals were discovered in the vicinity of the Tiutihe River, in eastern Siberia, north of Vladivostok, according to *Commerce Reports* of Jan. 2. J. I. Bryner, owner of many claims, succeeded in interesting Baron Hirsh in these deposits. The country was prospected and opened up in a businesslike manner, and a few years before the war a large amount of German capital was invested in the opening of several silver-zinc mines, in the construction of a railroad about 30 miles long, in dredging the mouth of the river, and in building wharves, houses, and similar accommodations. At present [written Aug. 20, 1918], this mining undertaking, because it represented German interests, has been seized by the Russian government and is for sale.

Distributing Government's Sulphur

The Government's stock of sulphur when the armistice was signed was 90,000 tons, according to L. H. Hartman, one of the directors of the stock division of the War Department. Two of the largest companies that had supplied the Government with sulphur during the war were called in and asked as to the best way to dispose of this accumulation. They suggested that for every 1000 tons they dispose of they would also dispose of 1000 tons for the Government, thus effecting the distribution without disturbing the market price.

Editorials

The Situation in Zinc

IN THE haste of going to press with our annual review number, we were unable to present the zinc statistics for the United States in 1918 with all the detail that the returns of the producers made possible, or with the critical analysis that required careful consideration. Some additional data and comments may now be offered. The accompanying table gives the status of some things at quarterly intervals, the production figures being for the quarters terminating with the dates at the head of the respective columns.

	1917	1918			
	Dec. 31	Mar. 31	June 30	Sept. 30	Dec. 31
No. of smelters operating	26	24	24	24	24
No. of smelteries operated	38	34	31	32	32
No. of retorts in works operated	196,950	198,894	196,580	173,944	176,392
No. of retorts in use	127,193	124,072	110,956	118,008	124,068
Tons of distilled zinc produced	144,906	125,572	117,512	122,130	120,611
Tons of electrolytic zinc produced	5,837	8,096	9,404	11,124	10,568
Tons total zinc produced	150,743	133,668	126,916	133,254	131,179
Tons stock on hand	60,415	64,443	46,081	45,788	40,325

The production of spelter was maintained at a rather uniform rate, quarter by quarter, during the year. When the market was so sick in the early part of the year, and curtailment was the order of the day, production fell off sharply in the second quarter, but with the natural rally in the market producers mistook its meaning and light-heartedly increased their production to about the rate of the first quarter and maintained it during the fourth quarter, although nearly two months of the latter were after the armistice. The statistics make it evident that they overstayed their market, maintained their production when they ought to have been curtailing, and, in general, that they had either a misconception of the true state of affairs or were buoyed up by false hopes.

The statistics of exports of spelter in the first 10 months of 1918 show that 70,000 tons went out. If we estimate the exportation in the last two months at the same rate, and compare with stocks at beginning and end of the year and production during the year, we arrive at domestic deliveries by the smelters of about 460,000 tons. It is incredible that domestic consumption was really so large as that, and the obvious inference is that spelter passed into invisible stock. Indeed, we know that the Government accumulated a good deal and that many private manufacturers have large piles in their yards. The publication by the Government of weekly stocks in the hands of smelters was deceptive and mischievous.

A common idea among producers soon after the armistice was that we should be able to sell a good deal of spelter to England, France, and Italy. Some high-grade spelter was, indeed, sold thither in the early days, but when exporting houses began to "feel" the foreign markets, which they did as soon as possible, they found not only absence of interest, but also obstruction, and it became known later that both France and Great Britain had large stocks of spelter that they purposed using up before they bought any more. On Jan. 1 the British Ministry of Munitions reported 34,000 short tons of spelter in its possession in Great Britain. How much that ministry owns that is not yet in its possession in Great Britain, and how much private parties have in Great Britain, are unknown. In France there is, according to our private advices, a stock of 45,000 short tons, enough to keep her going for a long time. The Japanese statistics of exports for nine months indicate the existence of a considerable stock there. Australia is reported to have 300,000 long tons of blende concentrates in stock, equivalent to a production of about 130,000 short tons of spelter. Freight rates, especially in British ships for purposes of British needs, are coming down rapidly, and the British increase in zinc-smelting capacity is on the eve of becoming available. In this country there is a surplus of zinc ore. Oklahoma producers are willing to sell it for low prices, and western producers find difficulty in selling it at all.

These are facts that have got to be looked squarely in the face. They relate to the immediate situation and offer an adequate explanation of why the spelter market has been declining steadily during the last three months and has now gone below 7c. for common spelter, while it is doubtful if high-grade commands a premium of any more than 1c. These prices may be below the cost of production in many cases, perhaps below the cost of a large part of the production; but there exists a situation in which cost of production has nothing to do with the immediate market. Besides the things that everybody can see plainly, organic factors are developing that will be of increasing potency. It is time for the American zinc industry to examine its position, revise its views, and give serious consideration to the future.

Price-Fixing

ABOUT 18 months ago the price-fixers were rampant and were talking about the law of supply and demand as being an antiquated theory of economics that probably never was sound. The Administration proceeded to act in accordance with that belief. There were some immediate consequences. The coal famine of 1917-18 was one of them, probably the most serious. In other cases the manifestations of trouble were delayed. We are beginning now to face the results. Among the metal industries we see copper confronted with prostration. Lead, which experienced less interference, is in a much better way. It may be said that zinc has a gloomy outlook and suffered no interference at all. That is true, but zinc has organic troubles peculiar to itself.

The greatest menace to the business of the country now is that which results from fixing a minimum price for wheat. This is the greatest obstacle to the resumption of normal industry, for it tends to maintain the cost of living when wages have got to come down. It

is clear enough that wages have got to come down or industries will have to shut down. There are two horns of dilemma with food continuing costly. The Government will have to keep its promise to the farmers. This may cost it a billion dollars or so. Whence will come the money? From taxation, of course; but there are not going to be any war profits in 1919. Indeed, the objurgated "profiteers" of 1917-18 were to a large extent putting profits into plant which really were not profits at all, as they see now when they are writing them off. Even the Government sees that it has got to write down its ship-building investment by some billions. When it comes to paying taxes this year people will think more about how money was squandered.

People at large will soon begin to see the truth of what the unpopular, old-fashioned economists told them. The laws of nature cannot be repealed. Interference with them inevitably produces a train of worse evils than the temporary one that it is sought to remedy. So intricate are the workings of nature, as exemplified in the laws of trade, that no one could have reasoned out all of the ramifications of peril that are now becoming plain. Danger was foreseen and warnings were given. Every real student of economics knew that price-fixing in any form was an economic sin that would bring its own penalty.

The Problem of the Mine Foreman

AMONG the changes from the old order is the greater attention that is being paid to the duties and personality of the mine foreman. True, the transition is not entirely complete, but, in the process of developing and perfecting the mine organization of today, mine operators realize that attention must be given to adequate and proper supervision, to complete the coöperative scheme upon which rests the success or failure of the enterprise. Under the earlier arrangement of things, where a small organization could be managed by a few, the process of supervision was a fairly simple problem, but today, with single operations demanding a large number of men widely distributed, it is essential that every effort should be made to produce a smoothly working machine.

The successful foreman is now judged by his ability to get results, and though this particular qualification does not differ from what was demanded 10 or 20 years ago, the manner by which such results are obtained requires a different method than that under which our predecessors worked.

The old type of foreman or "boss" was in a sense the master of his particular domain. His was the power to hire or fire; his word was the law; his way of doing things absolute; and, right or wrong, the management stood behind him so long as he produced results. But with a gradual advance of methods and ideas, mine labor has demanded more, and the result is that "the day of conscripted brutality has passed." The inference conveyed by the phrase may perhaps be unfair, for there were to be found, among the older types, many men of ability who possessed an excellent sense of fairness and executive acumen, and it is those examples that the foreman of today may well follow.

Various factors have contributed to bring about this change: the rapid increase of wages, the development of the welfare movement, a growing confidence in the mine organization, and a demand for superior knowledge have all served to strengthen the desire of the men that the "boss" or foreman should be worthy of the position which he holds.

The development of elaborate systems of cost analysis has made possible much progress in determining the actual worth of men in the various mine occupations; a correct proportion of wages for mine work is probably as well established in underground operations as in any other industry, and the expense of training each unit of the organization is fairly well known. Considering these factors, and assuming that a satisfactory basis has been reached, there remains the need of completing the system whereby the organization may continue in successful operation.

The link in the chain is the foreman. First of all, he must be a diplomat, for it is not only in mining that he must be trained, but in the study of human nature, and it is the lack of this trait that has been the downfall of many otherwise efficient men. The mere transmission of knowledge, as expressed in an order, is one thing; the correct execution of that order is another; and it depends almost entirely upon the "contact" that exists between the men and the foreman, which is obtainable, as before stated, only by study and an appreciation of the variables in human nature.

Several of the larger mining companies have adopted coöperative plans which aim to bring about a more thorough understanding between the mine workers and the management, and to adjust certain differences that may occur. This form of arbitration is undoubtedly effective, and goes far, but does not lessen the responsibility which should rest on the mine foreman or boss. His work is the daily contact with the men, not the occasional one, and his greatest value to the company lies in his ability to insure coöperative effort.

The following rules for foremen, reprinted from a bulletin recently issued by the National Safety Council, are of interest in this connection:

Be fair. Have no favorites and no scapegoats. A foreman has to act as judge many times every day; therefore, he must be just.

Make few promises, and keep them. A foreman must be exact in this particular. Sometimes a foreman forgets that his job requires a high standard of truth and honor.

Don't waste anger—use it. Anger is valuable and should not be used carelessly. Keep your most forceful language for special occasions.

Always hear the other side. Never blame a worker until he has been given a chance to give his point of view.

Don't hold spite—forgive. When you have had to scold a worker, go to him later and show him his faults in a friendly way.

Never show discouragement. Never let yourself be beaten. A foreman must have perseverance and the "never-say-die" spirit.

Notice good work as well as bad. Let the workers see that you can appreciate as well as condemn.

Watch for special ability. Take a keen human interest in your workers. Put each one where he can do his best.

Take your full share of blame. This is the most difficult of all. The foreman who can share both blame and praise with his workers has discovered the secret of managing men.

Prevent accidents. Educate or eliminate the careless man. The good foreman is known by his men.

The situation demands big men, men who can secure "team work," and, together with the routine duties, carry the idea to the men that by serving the interests of the company they are working to their own advantage. The problem is one of system combined with good understanding and common sense.

Held for Ransom in Mexico

ANOTHER letter from Mexico lies before us. A paragraph, after judicious censoring, would read as follows:

> Everything is just about the same down here in Mexico—no better or no worse. I have just returned from a trip to ——, and while in that place the startling intelligence was brought in that Mr. ——, of the —— mining company, was captured by bandits operating in that state and has been held for 10,000 pesos ransom. Steps were taken immediately to secure this sum, and I do not doubt but that Mr. —— is at liberty at the present writing.

American citizens in that distressful country are apparently ceasing to remember that they have a right to expect aid and assistance from the United States; and, failing this, have no course but to acquiesce to the outrageous demands of the bandits and those super-bandits with whom the former work in harmony.

Without official protest from this side of the border there is every prospect of an immediate expansion of similar outrages. The method described by our correspondent indicates an absurdly simple way for Mexicans to raise almost unlimited funds from American citizens and American companies.

BY THE WAY

A recent bulletin says: "The War Trade Board announces the removal of the following commodities from the Export Conservation List, effective Jan. 6, 1919: Arsenic and compounds thereof; arsenate of lead; arsenate of soda; arsenite of soda; lead, arsenate of; sodium compounds, as follows: Arsenate, arsenite." We are almost certain that the writer of the foregoing, when he salts his matutinal eggs, uses not only salt but sodium chloride, chloride of sodium, and the sodium salt of chlorine.

An investigation by the Providence Mining and Engineering Co. of Charleroi, Belgium, shows that for the three months of the last year of the war, without any epidemic, the mortality rate among its 2000 men was 3.5 times as great as that for the corresponding period in 1913; that the physical resistance to sickness had been reduced to a third of the normal resistance, that is, three times as many men were on the sick and disabled list, and that the average weight of its workers, except 5%, made up of young men, had fallen greatly. Since the beginning of the war, 35% of the company's men show losses in weight of from 10 to 40 lb. each.

"One often finds at the bottom of the water pieces of pure copper of 10 and 20 lb. weight," wrote Father Allouez of his journey to Lake Superior in 1665-67. "I have several times seen such pieces in the savages' hands; and since they are superstitious they keep them as so many divinities, or as presents which the gods dwelling beneath the water have given them, and on which their welfare is to depend. For this reason they preserve these pieces of copper, wrapped up, among their most precious possessions. Some have kept them for more than 50 years; others have had them in their families from time immemorial and treasure them as household gods. . . . For some time, there had been seen a sort of great rock, all of copper, the point of which projected from the water. This gave passers-by the opportunity to go and cut off pieces from it. When, however, I passed that spot, nothing more was seen of it; and I think that the storms—which here are very frequent, and like those at sea—have covered the rock with sand. Our savages tried to persuade me that it was a divinity, who had disappeared for some reason."

The principal lead mine in China is the Shuikoushan, in Hunan, owned by the provincial government, according to *Commerce Reports*. The official records of the output of this mine over a period of 20 years show that it produced 50,000 tons of lead and 126,000 tons of zinc concentrates. It employs 5000 laborers, who receive from 12 to 30c. (Mexican silver) per day. The Kungshan mine in Tungchwan, Yunnan, is the only other large lead mine in operation in China.

On one occasion a Virginian was coming up over the divide from Gold Hill late at night, wrote Dan De Quille in the "Big Bonanza." He had three $20 gold pieces in his breeches pockets and was sauntering along with his hands in his pockets. Suddenly a masked man stepped before him, and, thrusting a pistol in his face, cried, "Hold up your hands, sir!" The footpad searched his pockets and found nothing. The Virginian had closed his hand upon the three "twenties" and held them above his head, while submitting to the search. The footpad was evidently much disappointed, as he said, "If you ever come along here again without any money, I'll take you a lick under the butt of the ear. That's what I'll do with you."

A well-known consulting mining engineer, who is also the president of a large company operating near but on the wrong side of the Mexican border, started from the vicinity of Bisbee on a trip elsewhere. Arriving at Benson, he employed the moments during which his private car was being switched about here and there, preparatory to being attached to No. 9 on the main line of the Southern Pacific, by strolling over to the Benson House and exchanging views on various topics with some of the many friends always encountered in the Southwest. Meanwhile the chargé d'affaires of the car decided to visit around a little on his own account, prevailing upon a dusky brother from an adjacent sleeper to mount guard and discourage any trespassing. The substitute tyler of the establishment was a person of much experience in attending to the wants of well-to-do tourists, and in the course of years had acquired a supercilious contempt for what he chose to consider "po' white trash." In fact, good clothes and an air of ready money served for him as a sort of rapid colorimetric assay of gentility. So that, when the rightful occupant of the car returned in advance of his customary servitor, he was greeted with "Look-a-yere, now; is yo' aimin' to git abo'd dis car?" A curious twinkle played about the eyes of the one addressed, and with a good-natured grin he planted a dusty shoe on the lower step and felt for the latch of the ornamental gate. Nonplussed for a moment, the Ethiopian's authority asserted itself as he exclaimed, "Hol' on dere. Yo' go 'long up in one ob dem day coaches forward where yo' belongs, w'ite man; dis yere am Doctor Ricketts' car."

NEW PUBLICATIONS

Handbook of Mineralogy, Blowpipe Analysis and Geometrical Crystallography. By G. Montague Butler. Pp. 155; 4 x 7; illus.; leather; $3.50. John Wiley & Sons, New York.

Practical Surveying and Field Work, Including the Mechanical Forms of Office Calculations, With Examples Completely Worked Out. By Victor G. Salmon. 5 x 7½; pp. 204; illus. J. B. Lippincott Co., Philadelphia, Penn.

Oxwelding and Cutting. A Manual of Instruction. 5 x 8: pp. 124; illus.; paper. Murray Howe & Co., New York.

An illustrated pamphlet giving in detail the solution of 60 welding problems.

Bibliography of North American Geology for 1917, With Subject Index. By John M. Nickels. Pp. 154. Bull. 684, U. S. Geological Survey, Washington, D. C.

Quarry Safety Rules. Issued by the Industrial Accident Commission of the State of California. Pp. 57; 4½ x 6: paper. Industrial Accident Commission of California, San Francisco, Calif.

A pamphlet containing accident-prevention rules, for quarrying, similar in outline to state laws for the operation of factories and steam-boiler plants.

The Rustler Springs Sulphur Deposits. By E. L. Porch, Jr. Pp. 71; illus. Bull. 1722, University of Texas, Austin, Texas.

A pamphlet outlining the results of investigations on the sulphur deposits at Rustler Springs, Texas, with special reference to their physical characteristics and geologic relations.

The Safety Movement in the Iron and Steel Industry, 1907 to 1917. By Lucian W. Chaney and Hugh S. Hanna. Pp. 299; illus. Bureau of Labor Statistics, Industrial Accident and Hygiene Series No. 18. U. S. Department of Labor, Washington, D. C.

The results of a study of accidents in the iron and steel industry are given, together with the accumulated knowledge of recent years in the field of accident prevention.

Methods of Shutting Off Water in Oil and Gas Wells. By F. B. Tough. Pp. 122; illus. Bull. 163, U. S. Bureau of Mines, Washington, D. C.

This bulletin deals with a topic that is exceedingly wide, and will doubtless be under consideration and discussion so long as there are enough known deposits of oil and gas remaining in the earth to make their development profitable. The Bureau of Mines has repeatedly called attention to the importance of protecting oil or gas sands from the encroachment of water, and the purpose of this paper is to summarize existing knowledge of methods and devices.

Mill and Cyanide Handbook. By A. W. Allen. Pp. 128, with diagrams and charts. $2. J. B. Lippincott Co., Philadelphia, Penn.

In some respects this is a unique book. It contains no written description, but consists of a series of tables, formulæ, diagrams, report forms and a glossary logically arranged to suit the convenience of the metallurigst and millman. The book has been compiled in response to the everyday needs of those engaged or interested in the planning, management or operation of metallurgical plants, and is bound in convenient form. It should be useful to those engaged in the same or similar lines of work. As a contribution to metallurgical technology it should find a welcome place upon the bookshelf of every cyanider and millman.

Mine Tracks; Their Location and Construction. By J. McCrystle. 5 x 7½, pp. 105; illus. $1.50. McGraw-Hill Book Co., New York.

A handy little book dealing with practical details of the location and construction of mine tracks. The author remarks in his introduction that: "With many mining companies, I have found that, after they are satisfied as to the merit of the equipment, the subject of trackwork is neglected, and the manner of installation and the specific application, the selection of the frogs, switches, etc., go by default to the fireman or trackman. Generally speaking, no efficient trackwork can be accomplished without prescribed rules to govern this work." The author gives a number of such rules. Though the book deals more particularly with colliery operations, it should be of considerable service to the foremen of metal mines.

The Production of the Precious Metals During the Year 1917. Annual report of the Director of the Mint for the year ended June 30, 1918. Pp. 259; 6 x 9¼. Office of the Director of the Mint, Washington, D. C.

The book contains a great deal of interesting information on the operation of United States mints during 1918. The domestic coinage for the year amounted to 714 million pieces, compared with 406½ million in 1917, and 155 million in 1916. In addition, 52 million pieces of coins and blanks were issued for foreign governments. Sixty-eight million silver dollars were also converted into bullion during the period and interesting data are given as to the operation of the new Rennerfelt electric furnace at the Philadelphia mint. Statistics are also presented indicating the production and consumption of gold and silver in the United States in 1917. An appendix contains a large amount of related information, culled from various sources.

Innovations in the Metallurgy of Lead. By Dorsey A. Lyon and Oliver C. Ralston. Pp. 176, illus. Bull. 157, U. S. Bureau of Mines, Washington, D. C.

The data reported in this bulletin are largely the result of experiments conducted by the Salt Lake City station of the U. S. Bureau of Mines, in coöperation with the department of metallurgical research of the University of Utah. The work on lead is only one of the phases of the investigations carried on at that station during the years 1914 to 1916. The results of similar work with zinc ores and with copper and other ores will be published in future reports of the bureau.

The application of new hydrometallurgical and other methods has been made to the following ore types: (a) oxidized lead ores; (b) oxidized lead ores containing precious metals; (c) oxidized lead-zinc ores: (d) simple sulphide ores of lead; (e) leady zinc concentrates; (f) lead-iron sulphide middlings; and (g) complex sulphide ores of lead, zinc, iron, and copper, with or without precious metals. It has been found that a saturated solution of common salt is a good solvent for lead chloride and lead sulphate; and, in all leaching tests reported herein, brine leaches, with or without the addition of sulphuric acid, were used. The lead may be precipitated with lime from solutions that are not contaminated with other elements, and by electrolysis when the solutions are contaminated.

Three alternative methods have been tested in the treatment of materials containing oxidized lead, as follows: Sulphidizing and flotation, acid-brine leaching of the raw material, and volatilization of the lead with the recovery of lead chloride fume. All ores do not yield to flotation, and only those that do not contain excessive proportions of acid-consuming constitutents yield to acid-brine leaching, whereas nearly all the materials tested have yielded to the volatilization method, irrespective of the kind of gangue.

The oxidized ores of lead are usually argentiferous, but occasionally some gold is also present. Silver is often present, in considerable amounts, as the chloride, which is soluble in acid brine. The sulphide of silver is only slightly soluble in acid brine, so that the acid-brine method of treating oxidized lead ores usually fails to give good extractions of the silver. Sulphidizing and flotation, where applicable, usually extracts the precious metals together with the

oxidized lead minerals. However, the experiments described have shown that the precious-metal minerals are not necessarily intercrystallized with the lead minerals, and usually will be extracted in smaller proportions than is the lead. Chloridizing roasting and leaching give better results, although the best conditions seem to be those where only part of the lead chloride is volatilized, the rest of the lead being leached with the silver and the gold. By raising the temperature of the roast to 900° C. or more, the silver and the gold will be volatilized with the lead, making leaching unnecessary.

Treatment of the oxidized zinc-lead ores is more difficult. Sulphidizing and flotation will often remove the lead minerals, together with any silver that might be present, but much of this ore contains sulphur-consuming constituents that make sulphidizing difficult. The lead can be removed by the chloridizing and volatilization method, although some of the zinc tends to accompany it, using up salt and lowering the extraction of lead.

The simple sulphide ores of lead may be treated by the volatilization method, or by chloridizing or sulphating roasting followed by brine leaching. Chloridizing roasting and leaching seems to be the most successful method where silver is present, and promises to compete with gravity concentration and flotation, followed by smelting.

Lead can be removed from leady zinc sulphide concentrates without affecting the zinc sulphide, by a quick chloridizing and volatilization. The lead chloride fumes can be caught in an electrical precipitator, and converted into metallic lead by fusion with lime and carbon, yielding a calcium chloride slag which is a desirable substitute for salt in chloridizing and volatilization. Lead may be extracted almost completely from lead-iron sulphide middlings by the volatilization method. Silver, if present, usually does not chloridize well and does not volatilize. Brine leaching gives low extractions of silver. Extraction of the lead from the complex mixed sulphides of lead, zinc, copper, iron, and the precious metals by the volatilization method is likewise possible. Very little of the copper, silver, or gold is chloridized in this method, and, therefore, even after chloridizing leaching, these metals remain with the zinc sulphide. The iron sulphide is generally converted to ferric oxide in roasting, giving the material the appearance of having been thoroughly roasted. However, the unaltered sulphides of zinc and copper, and any residual lead sulphide, can usually be removed from the roasted material by fine-grinding and flotation, the iron being left in the residue.

The methods mentioned cover most of the important places in which lead losses occur. Possibly certain flue dusts from lead smelteries could be advantageously treated by brine leaching, because the lead in the flue dust usually consists of basic lead sulphate and lead oxide, which are soluble in such a solution. However, no experiments were made with such dusts.

Some of the proposed processes, from a study of their probable costs, deserve serious consideration, as they promise to be cheap, and usually give higher extractions of metal than are possible by the usual methods. The fact that most of them produce metal, not concentrate, will particularly recommend them to operations conducted at a point distant from smelting or transportation facilities. Also, methods adapted to arid conditions in arid regions are presented that should be of importance in the exploitation of the low-grade lead ores in some Western districts.

Everyman's Chemistry. By Ellwood Hendrick. 5½ x 8 in.; $2. Harper & Bros., New York.

In an introductory chapter the author states that the book is written for the man who shakes his head and exclaims that he knows nothing about chemistry whenever the subject is mentioned. A difficult task has therefore been attempted. The layman in chemical matters, whose interest is sought, looks for the reverse of heavy reading. Not only should such a treatise be free from unintelligible technicalities, but it must be written in that easy style that one is accustomed to meet in the editorial columns of a daily paper. Withal, the book must carry the hallmark of accuracy.

Mr. Hendrick has done remarkably well. "Everyman's Chemistry" is characterized by a fluent ease of diction; and the reader will find no stumbling blocks to progress in the form of involved phraseology such as often detracts from the value of more technical treatises. None but a carping critic would do more than draw attention to the very few errors which are noticeable.

Although the intended scope of the volume, according to the author, is limited, it may be safely predicted that it will have a wider audience than was originally expected. In addition to those who shake their heads and disclaim any knowledge of the subject, there is a large group of technical men, many of whom are specialists in some particular branch of chemical industry, to which Mr. Hendrick's book will appeal. For chemistry is so vast a subject, and its ramifications are so varied, that the majority will agree with him when he says that the man who knows all about chemistry is a poor creature and bereft of imagination. It is the busy specialist who will appreciate an opportunity to learn of other branches of technical endeavor, and who will be glad to do so in so pleasant a manner. For the book under review contains such a mass of interesting information, presented in so charming a style, that no one could read it without pleasure, and exceedingly few could do so without profit.

Much of the book is written in lighter vein, which does much to sustain interest. As an example, we are told, in an introductory chapter, that the elements "are given to polygamy and polyandry as matters of entire propriety; and, if it were not for the fact that we cannot imagine atoms as having sex, the way they shift about in their matings would scandalize any community." Passing from "the heart of the thing" to "phases of matter," the author expounds first principles in an altogether delightful manner. The final lines of a jingle on the Brownian movements are an indication of his versatility:

> "The source of most colloidal fright
> Is found in the electrolyte.
> Its advent, though it be disguised,
> Will stop the dance. They're paralyzed,
> The particles. The dance will stop
> And down the particles will drop.
> Well, we're like that. Though young or old,
> We imitate colloidal gold.
> And when the grim electrolyte
> Grips us in his unconquered might
> With skull and crossbones, then we shout,
> As we fall down: 'The light is out!'"

Occasionally Mr. Hendrick adopts the rôle of critic. In connection with the waste of coke byproducts, for instance, he says: "Some day, unless we go to pieces and lose our arts and sciences and take to the woods again like Indians, we shall have a sense of the fact that future generations have rights, and that these precious hydrocarbons, that it has taken nature hundreds of thousands of years to produce, should not be idly destroyed as though we were a nation of drunken sailors. There is no use in growing angry and blaming anybody for this cataclysmic waste; but now that we know better, it is time to stop it."

It is difficult to select any particular section of the book for special mention. Purely technical matter can usually be condensed without damage. To attempt to give a résumé of Mr. Hendrick's book would be to invite disaster because nothing of this kind could convey an adequate impression of its charm. It should be read by all, even those who maintain that they know all about the subject. It will appeal especially to the layman, who will probably learn for the first time that "chemistry washes us, launders our clothes, and bleaches and dyes them; it provides us with metals, with our morning paper and with books; it helps the farmer to grow our food; and when all is over, whether we be burned to ashes or buried in the ground, it is by chemical processes that our bodies go back into the great order of things."

Personals

Have You Contributed to the Association of the 27th Engineers?

N. O. Bagge, mining engineer, of New York, has returned from a trip to Arizona.

Capt. H. W. Edmondson, of the 28th Engineers, recently returned from France and is now in New York.

H. B. Johnson, mining engineer, has completed his professional work in Texas and has returned to Boston.

J. W. Bennie, general manager of the Shannon Copper Co., Clifton, Ariz., has been on a visit to El Paso, Texas.

C. A. Lanigan, formerly general manager of the Onahman Iron Co., of Duluth, Minn., has resigned. **W. H. Squier** is his successor.

A. P. Watt, consulting engineer, of New York, has opened an office in Boston, where he will continue to specialize on ore concentration.

W. Earl Greenough, mining engineer, of Spokane, Wash., recently completed an extended professional trip through Baker County, Oregon.

J. P. Gordon, government engineer for Manitoba, has begun a reconnaissance survey of the proposed railway from The Pas to the Flin Flon copper field.

Herbert A. Megraw, metallurgical engineer, is now with the Kennedy-Van Saun Manufacturing and Engineering Corporation, 120 Broadway, New York.

F. H. Andrews, construction engineer for the Huff Electrostatic Separator Co., is doing professional work in Texas, where he will remain for about two months.

Nathaniel Herz was at the headquarters of the American Institute of Mining Engineers, New York, during the last week. Others who registered were **H. D. Trounce** and **John T. Fuller.**

Irwin H. Cornell has been released from duty by the Non-ferrous Metals Section of the War Industries Board, and has resumed his position as sales manager of the St. Joseph Lead Company.

Frederick Burbidge, mining engineer, general manager of the Federal Mining and Smelting Co., of Wallace, Idaho, is in the Miami district, Oklahoma, where the company is operating zinc mines.

Joseph Clendenin, vice-president of the American Smelting and Refining Co., in charge of copper sales, has been made a chevalier of the Legion of Honor in recognition of his valuable services to the French government.

Francis N. Flynn, manager of the Consolidated Mining and Smelting Co. of Canada, at Trail, B. C., has resigned to become assistant general superintendent of the Balbach Smelting and Refining Co., Newark, New Jersey.

J. Leonard Replogle has been elected chairman of the board of directors of the Wharton Steel Co. He left the company some time ago to become director of steel supply for the War Industries Board, and has now returned to regular business. It is expected he will resume his former activities.

Walter K. Mallette, having completed the construction of the Bunker Hill smeltery at Kellogg, Idaho, has removed to San Francisco, where he will have charge of designing a modern lead smeltery, to be built at Penarroya, Spain. He will be associated with Bradley, Bruff & Labarthe, engineers.

Simon Guggenheim, present chairman of the Board of Directors of the American Smelting and Refining Co., has been elected president to succeed his brother. Daniel Guggenheim, who will remain in the directorate of the company. Murry Guggenheim will also remain as a director.

F. S. Peters is in charge of the Rossland mine of the Consolidated Mining and Smelting Co., of Canada. Other mine superintendents are given in the company's annual report as follows: E. G. Montgomery, Sullivan and St. Eugene mines; L. W. Oughtred, Highland mine; John Cannon, Number One mine; Ronald Stonier, Molly Gibson mine; Dan Matheson, Ottawa and Rock Candy mines; Edward Nordman, Emma mine; D. M. Tattrie, Lucky Thought mine; William Clancy, Coast Copper Co.; and G. H. Kilburn, Blue Grouse mine. The field operations are under the direction of M. E. Purcell, R. M. Macaulay, J. K. Cram, and G. H. Kilburn.

Obituary

Roy Crump, mining engineer, of Tonopah, Nev., died recently of pneumonia, following an attack of influenza.

Ernest H. Simonds, metallurgical engineer, died at Oakland, Calif., Dec. 26, of influenza. Mr. Simonds was a graduate of the University of California and for a long time was instructor of assaying at that institution. Many of the California graduates will hear of his death with keen regret. After leaving the University of California, Mr. Simonds opened an assay office in San Francisco. The business was successfully established and was continued until the San Francisco earthquake and fire wiped it out. Simonds went next into metallurgical engineering, and established himself in a good practice.

Logan Waller Page, director of the U. S. Office of Public Roads and Rural Engineering, died in Chicago, Dec. 9. He was born in Richmond, Va., in 1870, and was a student in engineering at Virginia Polytechnic Institute for two years and at Harvard University for six years. Later, at Harvard, he was in charge of tests of all materials used by the Massachusetts Highway Commission and some for other states and Canada. In 1899 he made a study of road-building in Europe. A year later, he became chief of the road-material laboratory, U. S. Government, afterward reorganized as the division of tests. In 1904 he became director of the Office of Public Roads, and was largely instrumental in formulating a comprehensive scheme for the testing of rocks, which is now being adopted in the mineral industry to prove the suitability of local stone for tube-milling.

Robert Lee Whitehead died at the Boothby Hospital, Boston, on Jan. 9, of pneumonia, aged 53 years. He was born in Amherst Courthouse, Va., and was a graduate of Lehigh University. His first work was with the Crozier Steel and Iron Co., of Roanoke, Va., of which he later became superintendent. In 1891 he went with the Baltimore Copper Smelting and Refining Co., to take charge of that company's silver refinery, and while there successfully worked out the process invented by his brother, Caleb Whitehead, for treating slime from the electrolytic copper refinery, a most difficult proposition at that time. He also devised other important chemical processes. About 1902, Mr. Whitehead went to Trail, B. C., where he installed processes for refining electrolytic slime for the Consolidated Mining and Smelting Co. of Canada. Later he was instrumental in installing parting processes in the mints at Denver and San Francisco, using his own ideas in both places. About 1909, he went to Perth Amboy, N. J., to take charge of the copper refinery at the American Smelting and Refining Co.'s plant. While there he invented the knife edge contact rod used in electrolytic tanks, and designed the plant for separating platinum from gold. He invented the process which formed the basis of the electrolytic tin plant, of which he also had charge and which has been a most successful installation. He left the American Smelting and Refining Co. last autumn and, at the time of his death, was engaged in the erection of an electrolytic tin refinery near Boston, where he intended to use an entirely new process of his own. Mr. Whitehead had arranged to sail for France in February and later go to England for the purpose of erecting electrolytic tin refineries.

Societies

American Mining Congress, Arizona chapter, has elected Norman Carmichael, general manager of the Arizona Copper Co., for president. Other directors are: Robert E. Tally, superintendent of mines for the United Verde Copper Co.; W. B. Gohring, superintendent of mines for the Calumet & Arizona Mining Co.; and B. H. Dowell, of Bisbee, Ariz. J. E. Curry, of Bisbee, is secretary of the chapter.

Duluth Engineers' Club, has unanimously passed a resolution favoring the creation of an organization for improving the status of the engineer, and has appointed the following committee to further that end and to compile complete data regarding the sentiment of the profession on the subject: O. H. Dickerson, member of the American Society of Civil Engineers; W. S. Heald, American Institute of Electrical Engineers; C. A. Graves, American Chemical Society; F. H. Linley, American Society of Mechanical Engineers, and D. E. Woodbridge, American Institute of Mining Engineers.

Industrial News

"The American Mineralogist," of Philadelphia, has announced the reorganization of its staff. Owing to the retirement of Wallace Goold Levison, Dr. Edgar T. Wherry, of the Bureau of Chemistry, Washington, D. C., will assume the duties of editor-in-chief, with the following associate editors: George F. Kunz, president, New York Mineralogical Club; Herbert P. Whitlock, American Museum of Natural History; Alexander H. Phillips, Princeton University; Waldemar T. Schaller, U. S. Geological Survey; Edward H. Kraus, University of Michigan; Austin F. Rogers, Leland Stanford Junior University; Thomas L. Walker, University of Toronto, Canada; and Samuel G. Gordon, Academy of Natural Sciences, Philadelphia.

Electric Furnace Co., Alliance Ohio, has just closed a contract with the Braeburn Steel Co., Braeburn, Penn., for a large continuous recuperative annealing furnace, for annealing alloy-steel bars and wire. This furnace will have a capacity for annealing 75 tons per day, and an electrical capacity of 600 kw. One of the special features is that the material is heated and cooled slowly, and, because it is a special alloy steel, must be soaked for considerable time at maximum temperature without scaling and without use of the usual annealing box covers. Another feature is that provision is made for cooling at a very slow rate for the first 200 to 300° from the maximum temperature. This type of furnace is meeting with favor among steel mills, on account of its many advantages over the old practice where hoods are required, and where it is difficult to get uniform annealing.

Trade Catalogs

Incandescent Headlights. Electric Service Supplies Co., Philadelphia, Penn. Sheet 96 H-6, Feb. 10, 1918; 9 x 9; illustrated. Describes mine type MLC-96 Golden Glow incandescent headlights and price lists of equipments.

Steam Mine Hoists. Lidgerwood Manufacturing Co., 96 Liberty St., New York. Bull. No. 19; 9 x 12, pp. 32; illustrated. Descriptive of steam mine hoists, electric mine hoists, steam and electric hoists for all purposes, cableways and cableway elevators for open-pit mining and stripping.

Gears. Philadelphia Gear Works, 1120-1128 Vine St., Philadelphia, Penn. Catalog, 1919; pp. 84; 5¼ x 8¼; illustrated. Describes fully generated spur, bevel, and spiral gears, rawhide and micarta pinions, worms and worm gears, racks, lead screws, sprockets, and "Diamond" chains. Copy free on request.

New Patents

United States patent specifications listed below may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

Furnace, Metallurgical. Bruno Zober, Philadelphia, Penn. (U. S. No. 1,285,883; Nov. 26, 1918.)

Gold Concentrator Comprising a Series of Screens, etc. Alfred R. Mackie, Lander, Wyo. (U. S. No. 1,286,185; Nov. 26, 1918.)

Hoisting Hook, Safety. Lewis P. Thestrup, Seattle, Wash. (U. S. No. 1,285,466; Nov. 19, 1918.)

Lead Bullion, Process of Treating. George P. Hulst, Hammond, Ind. (U. S. No. 1,285,714; Nov. 26, 1918.)

Lead, Method of Refining. Phillip Werner, Philadelphia, Penn., assignor of one-half to Russell Spicer, Willmar, Minn. (U. S. No. 1,285,511; Nov. 19, 1918.)

Magnesite—Process of Manufacturing Magnesium Carbonate. Bertrand B. Grunwald, Redwood City, Calif., assignor to National Magnesia Manufacturing Co. (U. S. No. 1,285,683; Nov. 26, 1918.)

Metal Nitrates, Preparation of. Walter O. Snelling, Long Island City, N. Y. (U. S. No. 1,285,824; Nov. 26, 1918.)

Ore Dressing—Machine for Separating Ores. John M. Stadel, Philadelphia, Penn., assignor of one-half to John Cunningham, one-eighth to Peter P. Conway, and one-eighth to Patrick P. Conway, Philadelphia, Penn. (U. S. No. 1,286,136; Nov. 26, 1918.)

Editorial Correspondence

NEW YORK—Jan. 18

The Unevida Gold Mining Co. has begun action in New York State Supreme Court against William C. Ralston, George H. Morrill, James L. Dowsey, William A. Slayback, Hamilton J. Combes, Adolph S. Lowenthal, Erastus S. Parson, Meyer Frank, C. E. George, the Unevida Gold Dredging Co. of Nevada, Comstock Lode Recovery Corporation, and others to recover leases, alleged to belong to plaintiff, but which have been transferred to Comstock Lode Recovery Corporation. Suit also calls for accounting. Temporary injunction granted preventing defendants from selling stock of Comstock Lode Recovery Corporation and also preventing defendants from disposing of leases pending settlement of action. According to papers in action, William C. Ralston and George H. Morrill were formerly directors of the Unevida Gold Mining Co. Ralston, aside from being director, was chief engineer, managing director, secretary, and member of executive committee of company. Complaint charges that defendants, two of whom were directors of Unevida Gold Mining Co., induced owners of leases, under which company operated, to cancel and transfer them to Comstock Lode Recovery Corporation, which, it is claimed, was formed by Ralston and associates to take over leases of these gold mining properties.

SAN FRANCISCO—Jan. 17

The Mining Division of the Industrial Accident Commission of California, according to the last annual report, considered the safety of 17,000 employees during the year. Special attention was given to advancing safety work among operators and miners by means of safety bulletins and letters. A first-aid instructor was added to the division, who trained 31 classes in first aid, which work was done at 20 places, from Shasta to Riverside counties. In all, 407 persons took the complete course and 300 part of it. Arrangements were made with the University of California extension division for a course in English for foreigners. The U. S. Bureau of Mines Car No. 1 visited 11 different mining sections, giving training to 86 employees in mine rescue and to 425 employees and citizens in first-aid work. The mining division inspected mines, mills, smelteries, gold dredges, quarries, and tunnels. Fatal injuries at quarries were reduced by the activity of the division. Safety rules for gold dredges as well as for quarries were prepared during the year. Merit rating of mines received the attention of the mining division. An electrically operated gold dredge has been added to the Safety Museum at 529 Market St., San Francisco. The museum now occupies about 3000 sq. ft. of floor space and contains hundreds of exhibits. H. M. Wolfiin is chief mine inspector.

SPOKANE, WASH.—Jan. 16

Regulation of Mining Companies, while avoiding the features of "blue-sky" laws, is the object of a plan now being worked out by the Northwest Mining Association, which discussed the problem at a recent session in Spokane. A committee, appointed to draft a proposed law, recommended that companies be required to file with the Secretary of State and the auditor of the county in which the company is organized a verified statement giving the number of shares of stock in the treasury, the situation and description of the property, the nature of title held, the amount paid for the claims, and the terms and amounts of any deferred payments. If it issues a prospectus or literature concerning the property, copies shall be filed in the same way, with a statement of the development, if any, that has been done on the property. When these statements are filed with the Secretary of State he shall issue a permit authorizing the sale of stock. In addition, it is recommended that similar statements shall be filed the first of each year; also a statement of the amount of treasury stock sold, the amount obtained from sales, the commissions paid, the amount of development work done, and the equipment purchased. The committee will later submit the draft of a bill to be presented to the State Legislature

SALT LAKE CITY—Jan. 16

Two Power Companies in Southern Utah, the Beaver River Power Co. and the Southern Utah Power Co., have passed under control of the Telluride Power Co., recently organized under the laws of Delaware to take over the merged companies. The Telluride company is controlled by L. L. Nunn and the Telluride Association, which is extensively interested in power operations in Wyoming. The new company is capitalized at $1,000,000 and has authorized a bond issue for this amount. With nine generating stations on Beaver River in Beaver County and elsewhere, 250 miles of high-tension transmission lines and systems supplying electric service to towns in southern Utah, the Telluride company has holdings stated to represent about $2,000,000. The new company will supply power to mines in Beaver County and in the Marysvale section in Piute County.

The Question of Apex Rights between the Utah Consolidated and Utah Metal and Tunnel companies in Bingham has been settled by granting reciprocal rights and privileges, without monetary consideration. The Utah Consolidated is to receive the two limestone bed formations, east of a certain fault known as the Highland Boy and Yampa, for which the Utah Metal in return will have unlimited and perpetual right to follow any limestone-bed formations or ore fissures in the western part of its ground down into the Utah Consolidated, regardless of the question of apex. The Utah Metal may also mine a strip of ground, 2000 ft. long and averaging 300 ft. in width (approximately 14 acres in all), marking the southerly workings and boundary of the Utah Consolidated. The Utah Metal has developed a body of copper ore of shipping grade in this ground, and has the right to use the Utah Consolidated workings in developing territory in this section.

The Judge Mining and Smelting Co., or its subsidiary, the Snake Creek Mining and Tunnel Co., of Park City, has won a water suit against the Midway Irrigation Co. The hearing was in the Federal Court, in Salt Lake City, before Judge Tillman D. Johnson. This suit has been in progress for some time, and was first tried four years ago. The water rights were of great value, and the suit was of particular interest as being between mining and agricultural undertakings. The court held that the water from the Snake Creek tunnel was percolating water, and hence belonged to the land, and that it made no difference whether or not the farmer's water was decreased because the water from the tunnel, though coming from fissures cut by the tunnel, was fed into the fissures by percolation. The fissures themselves are not regular water channels, but act as reservoirs. This decision is of interest to all mining companies whose tunnels have developed water in localities where water is used for irrigation purposes. In this suit the irrigation company contended that the Snake Creek tunnel decreased its water supply, that the fissures were water channels, and that, even if they were not, the water would reach them by seepage. The percolating waters, however, as held by the court, belong to the land and to the Snake Creek Tunnel Company.

WALLACE, IDAHO—Jan. 16 ...

Mines of the Coeur d'Alene District have continued in operation, with two exceptions, since the price of lead dropped. They have curtailed production, as far as possible, without disorganizing their forces, and no men have been laid off. If a man quits, no one is put on in his place. Sunday work has been discontinued, and it is probable that a five-day week may be adopted, this being more desirable than throwing a large number of men out of work altogether. The two exceptions are the Hercules and Tamarack & Custer, both controlled by the Days, the ores from which are treated by the Northport smeltery, also controlled by the same interests. The closing of the two mines just before Christmas threw about 700 men out of employment. The management announced that the shut-down would be for 10 days and possibly longer. Men who showed up at the end of this period were told that it might be several months before resumption. In the absence of any announcement by the Days regarding the affairs of their companies, the public is left to speculate why it was that the Day mines promptly quit and give no indication of early resumption, though other lead mines in the district are still running.

BUTTE, MONT.—Jan. 16

The Anaconda Copper Mining Co., the largest employer of labor in Montana, has announced that in respect to employment during the present period of curtailment, when many of the company mines are closed, it will give preference to men with families and to returned soldiers in the following order: First, married men and single men with dependents; second, demobilized soldiers and sailors who were in the employ of the company at the time of their induction into the Army or Navy; third, demobilized soldiers and sailors who were not employed by the company before such induction. Single men without dependents and who were not inducted into service must give up their jobs to those mentioned.

MORENCI, ARIZ.—Jan. 16

The Clifton-Morenci-Metcalf District is now undergoing curtailment of operations. The Shannon Copper Co., of Clifton, with mines at Metcalf, has closed down the whole property, and only "clean-up" work is going on. Over 300 men have been laid off in the mines alone, more than a third of whom have left the district to date. The Phelps Dodge Corporation, Morenci branch, has also begun curtailment. On Jan. 11, about 100 men were dropped from the payroll. The Ryerson mine, the largest producer for Phelps Dodge in the Morenci district, will be practically closed down soon. As far as possible, the married men are being transferred to other mines instead of being discharged. The Arizona Copper Co., Ltd., has not as yet decreased operations, but it is expected that such action is imminent.

DENVER—Jan. 15

Colorado Metal Mining Association and the Colorado chapter of the American Mining Congress held their joint annual meeting at the Brown Palace Hotel, Denver, on Jan. 2, 3, and 4, 1919. The resolutions committee was appointed as follows: Harry W. Robinson, of Denver; George C. Manley, of Denver; A. E. Moynahan, of Alma; M. T. Chestnut, of Dolores; John A. Traylor, of Breckenridge; J. C. Roberts, of Golden; W. O. Reynolds, of Leadville; E. D. Payne, of Empire, and Kenneth McKenzie, of Colorado Springs. Following these appointments, directors were elected from the various metal-mining counties. New officers for the ensuing year were then chosen as follows: Robert S. Ellison, governor; J. F. Welborn and Samuel D. Nicholson, vice-governors; George E. Collins, treasurer; and M. B. Tomblin, secretary. The meeting was addressed by George M. Vallery, assistant director, U. S. Public Service Reserve, on "Advantages of Coöperation with the U. S. Employment Service." J. C. Bailey then spoke on "Colorado Freight Rates", and a lively discussion ensued led by George E. Collins. It appears that Colorado operators have protested repeatedly against unjust freight rates, particularly as applied to narrow-gage lines, without relief or even satisfactory notice on the part of Government officials. Rate rulings were applied to narrow-gage the same as to broad-gage lines, despite the fact that narrow-gage cars cannot be used on broad-gage tracks. Unjust demurrage charges have been made on narrow-gage lines without any possibility of benefit from such practice. George Quigley, manager of the State Insurance Fund, pointed out the relation between the state fund and the mining industry. W. B. Lewis, secretary of the Boulder County Metal Mining Association, described his organization, and illustrated how coöperation had resulted from regular meetings and discussions of the leaders of various industries in a mining community. W. M. Porter read a paper on "Modern Mine Promotion," wherein he made a plea for honest and businesslike promotion of

worthy mining enterprises, and pointed out the ill effects of unrestricted wildcatting. During the evening session, Senator Siewers Fincher addressed the assembly on the subject of "State Legislation and the Mining Industry," and Arthur H. Bosworth spoke on the proposed " 'Blue Sky' Legislation." During the morning session of Jan. 3, James F. Callbreath, secretary of the American Mining Congress, delivered an address on "National Legislation and the American Mining Congress." In the afternoon, Bulkeley Wells, president of the congress, spoke on the gold situation. He read the resolutions passed by the American Gold Conference in August, 1918, as to the necessity for a Government bonus on gold. It was predicted that the committee of the Treasury Department would soon recommend that the bonus be offered. Senator-elect Lawrence C. Phipps pledged himself while in the Senate to consider the needs of the mining industry and work for an adequate tariff. He thought that tariff revision would solve many of the difficulties confronting the mining industry at this time. Governor-elect Oliver H. Shoup made a short address, in which he referred to general legislation in favor of the metal producers. Congressman-elect William N. Vaile spoke of the need of a protective tariff on tungsten and other rare metals. Nelson Franklin talked on "Relief for Producers of War Minerals," and pointed out the desirability of a protective tariff on these metals, referring to the so-called "chrome scandal." To those directly concerned the discussions on tariff were interesting, but others were inclined to reflect upon the law of "supply and demand" and the theory of "the greatest good to the greatest number," and to regard the advocators of tariff on war metals with that kind of sympathy that might be bestowed upon one who is crying for the moon. W. J. Candlish, speaking on Colorado war minerals, outlined the position of local producers. Among the more interesting resolutions introduced was that in which the association demanded immediate relief from the now useless Federal regulations and restrictions and petitioned Congress to remove the extraordinary powers temporarily conferred upon the Executive Department and to resume its legislative powers. The resolution pointed out that the war-time expedient of price fixing, administration of industrial matters by bureaus, and other species of Federal control should be speedily abandoned, that private initiative again may be the order of the day. It was demanded that the flat increase of 25% in freight rates and onerous demurrage and loading regulations established by the Director General of Railroads be abrogated. A guarantee was demanded that full prospecting and mining privileges be assured in the bill creating a national park of the Mount Evans region. Senate Bill 5234, to reimburse and settle losses incurred and investments made for supplying war minerals, was commended. It was also recommended that the Colorado Legislature appropriate $40,000 for completing a state survey, and for publication of reports by the State Geologist. Liberal state and national appropriations were asked for to investigate the possibilities of oil shale. The administration of the state compensation fund was commended. A law was asked for creating the Colorado Metal Mining Survey, to be formed of the directors of the Colorado Metal Mining Association, and supported by a state tax levy of one-twentieth of 1%, on the output of all metal mines in the state. It was suggested that an ore-sales committee be formed to investigate grievances reported by ore sellers against ore buyers.

HOUGHTON, MICH.—Jan. 18

The Calumet & Hecla-Isle Royale Injunction has been dissolved by the U. S. District Court of Sault Ste. Marie, on the announcement of the plaintiff, Godfrey M. Hyams, that he had severed connection with the Isle Royale. This marks the culmination of a legal contest between the Calumet & Hecla and the Bigelow interests which had its inception more than 10 years ago over the purchase of control of the Osceola Consolidated Mining Co. by Calumet & Hecla. By dissolution of the injunction, Calumet & Hecla will again have full control of the Isle Royale, and directors of the former are assured a place on the Isle Royale board at the next annual meeting.

Curtailment of Copper Production was recently decided on by Calumet & Hecla. Stocks of metal are accumulating on the lake docks. However, such a condition exists in normal times, and with a falling off in demand there is no occasion to ship by freight, as was the case during the last three or four winters. In the meantime, the mines are hiring a few men and building their forces up to normal. Attention will now be devoted to neglected development work, and openings that have been abandoned for three years or more will again be the center of important operations. Hardly a mine in the district did any sinking while there was such a big demand for the metal. Some of the mines speeded up to such an extent that they have reached the boundaries, and it is now necessary to make new openings. One of these mines is the Champion, of the Copper Range group, in which sinking has been under way for nearly a month. Baltic also is sinking again, after a lapse of three years, and the same holds true in some of Quincy's shafts. The Calumet & Hecla already has begun to sink at the old mine, and the subsidiaries likewise are directing attention to lower levels.

BATESVILLE, ARK.—Jan. 17

Statistics of Zinc Ore Produced in 1918 in the north Arkansas field have been completed by J. H. Hand, special agent of the Department of Mines. A total of 4,000,000 lb. was produced and sold, against 50,000,000 lb. in 1917. Practically all was calamine ore. Few mines were active in the field during 1918, and none of the big producers of former years, the operators being content to sit tight until either a better market materialized or overhead expenses went down. There is a general disposition, however, to start operations this year if conditions warrant, and some of the larger properties are making ready.

The Batesville Manganese Field is exhibiting little activity. Operators hope for a price of ore after the reconstruction period is over which will allow profitable operation. Ore can be produced in the district at a much lower figure than that set by the Government and which was paid in 1918. A limited tonnage was mined at different times before the war in competition with foreign ores. Owing to the fact that washing plants have been built and other machinery installed which will cut pre-war costs, it is thought that, when a market is established again, many properties will be able to produce. Walter Denison and associates have a 2000-ton contract at present and are producing ore to fill it. They cannot ship on the contract, however, until April 1.

JOPLIN, MO.—Jan. 19

Organization of Local Chapters of the American Mining Congress and the American Zinc Institute will be considered at a meeting of those interested to be held in Joplin Jan. 28 to 30. The movement is an outgrowth of the High-Grade Ore Producers' Association, which has virtually been put out of business, with money in its treasury, by the ending of the war. It is understood that funds of this organization will be used in putting the proposed chapters on their feet. The meeting has been called by a committee from the High Grade association, headed by Victor Rakowsky.

The Edwards Mining Co. has purchased the McBride mine and mill near Joplin, also the Joe-Bob and two other newer properties, and expects to mill the combined output at the McBride concentrator. It is one of the developments that has marked a seeming turn toward the older camps of the district from the Oklahoma field. At one of the Joplin soft-ground mines, now being operated steadily, the concentrates are put in the bins for less than $30 a ton, which is not possible in the Oklahoma field at any property with a recovery less than 20% (in local parlance), and there are few as rich as that.

VICTORIA, B. C.—Jan. 17

The Committee Named to Investigate Smelting Rates charged mine operators of British Columbia by the Consolidated Mining and Smelting Co. of Canada consists of S. S. Fowler, Riondel, B. C.; Ivan de Lashmutt, Silverton, B. C.; and James Anderson, Kaslo, B. C. The British Columbia government will be represented by A. G. Langley, resident engineer with headquarters at Revelstoke, B. C. The first session of this committee was announced for Jan. 21 at Nelson, British Columbia.

The Imperial Munitions Board has arranged for exporting the large quantity of lead on hand, recently said to be "hanging over the Canadian market," with the idea of relieving the market from embarrassment. F. A. Starkey, of the Associated Boards of Trade of Eastern British Columbia, expresses himself as highly gratified with the latter development, saying: "The sum and substance of the whole thing is that we will now have a clean sheet to start off with. The action of the board is timely. On Dec. 9, while in Spokane, I sent a wire to the board, pointing out that the dumping of the lead bought for munitions on the commercial market at this time would mean a glutting of the market, and that would be disastrous to the lead-mining districts. But the difficulty is now settled." Mr. Starkey's wire to Sir Thomas White, acting Premier, read: "During war, shippers did not have benefit of Canadian duty, but sold Imperial Munitions Board at practically United States prices. Now that the war is over, shippers expect that Canada will not be made a dumping ground for Mexican and United States surplus and scrap metal." Whether the action taken by the board with reference to the stock referred to will have the effect which Mr. Starkey looks for is doubted by some, who point out that Canada's biggest market is not local and that the placing of munition lead elsewhere will have the result of reducing the demand for the Canadian production at least for a time, and that, at the best, the prospect is that there are a few dull months to meet.

TORONTO—Jan. 17

Newman Erb, president of the Canada Copper Corporation, of British Columbia, at present visiting eastern Canada, states that the work of the company is being rapidly pushed on the Copper Mountain property, on which it is expending about $2,500,000. Approximately 12,000,000 tons of ore is blocked out carrying about 1½% copper. The company will be ready by July to carry out its contracts with several companies as follows: With the Canadian Pacific Ry. for extension of its branch 13 miles to the mine; with the West Kootenay Power and Light Co. for power; and with the Consolidated Mining and Smelting Co. for the treatment of ores.

Land Grants by the Canadian Government of large areas in the West to a private corporation for the exploitation of oil and minerals have been widely rumored. These rumors are unfounded so far as any definite action is concerned, but it has transpired that a proposition of this sort has been before the government for some time. The Shell Transport and Trading Co., of London, England, capitalized at $50,000,000, the head of which is Sir Marcus Samuels, has asked for exclusive rights to survey and exploit for oil all the country lying north of the Athabasca River, in Alberta, for five years, existing holdings excepted. The proposal was made to Premier Sir Robert Borden and his colleagues on the occasion of their last visit to England, and is understood to have the backing of the British government, on the ground that it is in the interests of the empire that a British company should develop the oil resources of Canada. The whole question was discussed by representatives of the Shell company and the Canadian and Imperial governments last year.

The Canadian Advisory Council for Scientific and Industrial Research is negotiating with the governing bodies of Toronto and McGill universities with a view of increasing the supply of trained research workers and technologists. It is urging that prompt measures be taken for extending university facilities for training and laboratory work. A recent inventory of the men available in Canada adequately equipped for grappling with problems of research work showed that the supply is hardly equal to five per cent. of the demands that Canadian industry must make, if it is to keep pace with what the United States, Great Britain, and other trade competitors are doing. There are fewer than 300 men, including those in government and university positions, to whom the research council or big industrial firms can turn for assistance in solving scientific problems bearing on industrial development. Chemists, physicists, metallurgists, electrical and chemical engineers are needed, and at present only Toronto and McGill universities have suitable graduate courses. The council has already provided for 20 studentships and fellowships to be awarded annually to science graduates in connection with some specified research, but so far the number of men available for such studentships and fellowships has limited the awards to less than half the total number provided for.

ARICA, CHILE—Nov. 17

The Smeltery in Arica, Chile, was blown in early in 1918, and produced around 70 tons of pig tin of 98.8%. There was some trouble with the furnaces afterward, and through this reason and lack of capital the plant was shut down after a few feeks' operation. Since then the capital has been increased from $250,000 to $1,000,000 and operations were again started a few months ago, but it is not known with what results. The plant uses reverberatory furnaces fired with fuel oil.

The Mining News

ALASKA

DECEMBER SHIPMENTS of domestic copper ore, matte, etc., from Alaska to United States were 24,872 gross tons. The copper content was 16,407,461 lb., valued at $4,263,992.

ARIZONA

Pima County

GUNSIGHT GOLD AND TUNGSTEN (Ajo)—Five-stamp mill and concentrator, with laboratory, installed two months ago to test district. Since then mill has run steadily making test runs on 20- to 50-ton lots of gold and scheelite ores from Black Bess, Bullion Bar, and Yellow Aster mines; also silver-lead ores from old Gunsight mine. All tests satisfactory. Will install during January ball mill of at least 40 tons' capacity. Mines of district, known as Scheelite district, well developed, and ample tonnage of good milling ore in sight. Test runs have yielded $2000 worth of amalgam and 500 lb. tungsten concentrates.

RAY BROKEN HILLS (Ray)—New tunnel advanced about 300 ft. Messrs. Erskine and Stanton, of New York, recently visited property.

LAVELLE GOLD (Winkleman)—Will deepen main shaft from 250 to 350 ft. Construction work on mill delayed two weeks by snow.

Yavapai County

KAY COPPER (Canyon)—Shaft down 600 ft. Will start crosscut at 650 level. Work begun at North shaft about 2000 ft. from main shaft. Similar orebody hoped for at new shaft.

CONGRESS (Congress Junction)—Congress, Alvarado, and Rincon mills, with all mining equipment and six-mile standard-gage railway, sold to Rosenburg & Co., of Los Angeles, who will dismantle property and sell equipment.

ARIZONA COPPER BELT (Constellation)—A 6000-ft. pipe line completed for camp's water supply. Fairbanks-Morse oil engine, compressor, and drills installed. Machine shop enlarged, and new bunk house and mess hall built. Development work continued in 300 level crosscut, which recently cut 20-ft. vein 350 ft. from shaft.

UNITED ARIZONA (Cordes) — Shaft down 835 ft. with 400 ft. to go. Crosscuts at 42 and 150 ft. disclosed 20 ft. of vein. Mill planned. Officers are C. H. Dunlap, president; R. C. Baker, treasurer, and C. W. Stott, secretary, all of Phoenix. C. J. Bendewald manager.

UNITED VERDE (Jerome)—Will decrease metal output 20%. Has dropped 130 single men and shut down one blast furnace at Clarkdale.

UNITED VERDE EXTENSION (Jerome)—Cutting production by sending 15% ore to Verde smeltery, drop of about 5%. Small cut made in mine force.

COPPER QUEEN GOLD (Mayer)—At coming annual meeting company expects to provide for 250-ton flotation plant. Property adjoins Arizona-Binghamton.

ARKANSAS

Baxter County

BALD DAVE (Mountain Home)—Prospect work with small force begun on property north of Mountain Home by Long Shot Mining Co. Outcrops carry carbonates of zinc and lead.

Independence County

BALL (Batesville)—Washing plant at Ball manganese mine, construction of which was begun several weeks ago, will be completed.

Marion County

EDITH (Rush)—Operation recently begun. Now producing. First ore being hauled to Yellville, shipping point. Influenza in camp caused labor shortage.

MATTIE MAY (Rush)—Full force at work. New concentrator nearing completion. Headings in good bodies of zinc carbonate.

NORTH STAR (Yellville)—Operations temporarily suspended on account of death of C. P. Pierce, of Kansas City, a large stockholder.

CALIFORNIA

Amador County

ARGONAUT (Jackson)—Mill tailings being retreated by Darrow concentration method. Sixty-stamp mill running at capacity.

CENTRAL EUREKA (Sutter Creek)—Development at 3500 level encouraging. Ore reserves expanded. Labor available for increased operation.

OLD EUREKA (Sutter Creek)—Expect to reach 3150-ft. depth in deepening shaft about middle of February. Shaft has three-compartments. Extensive development at depth will follow.

Butte County

DENVER (Forbestown) — Property changed hands. Unwatering and development to start immediately.

Nevada County

BENTON G. (Nevada City)—Cleaning out old tunnel to resume development after several years' idleness.

Placer County

FOUR CHROME MINES operating near Newcastle closed down and 300 men out of employment on account of short demand for chromite. Companies are Holmes, Steel Chrome, Noble Steel, and Placer Chrome.

San Bernardino County

NEVADA MINE LEASING AND HOLDING (Cima) — Has acquired Piute and Blackfoot silver-lead mines. Rights to property forfeited by former owners, and new operators resuming operation free from financial embarrassment. Development consists of shaft with 2000 ft. of workings. J. R. Comerford in charge.

COLORADO

Boulder County

BELCHER (Caribou)—High-grade silver ore opened, and two shipments made. E. E. Dunston manager.

CARIBOU (Caribou)—McKenzie Bros. & Co., lessees, developing. Crosscuts driven into hanging wall on 600, 680, and 740 levels, and parallel vein opened with high silver contents. Drifting on new vein. Development also in progress on 300 level, where crosscut is being driven into hanging wall.

COLORADO PITCHBLEND (Jamestown)—Properties examined by committee composed of J. W. McClave, M. S. McCarthy, G. L. Sheldon and O. E. Fisher. Report available in near future. J. F. Barnhill is manager.

SMUGGLER (Lyons)—Sinking of main shaft resumed. Crosscut driven to open parallel veins west of main vein. New compressor and machine drills installed. Mine buildings repaired. New development planned.

Clear Creek County

CLEAR CREEK & GILPIN ORE (Idaho Springs)—Community sampler now in operation. New machinery and automatic sampling device installed. W. E. Pasmore is manager and Ralph Chase assayer.

San Juan County

LACKAWANNA (Silverton)—Raise completed between tunnels No. 1 and No. 2. On second level orebody, 8 ft. wide and running well in lead, opened on Lackawanna vein. George W. Harris is president and H. R. Dealy secretary and general manager.

San Miguel County

STANDARD CHEMICAL (Nucla)—Reduction plant shut down to remain closed until about Mar. 1. Will retain small force on development. During 1918 company mined 7000 tons of radium-bearing ore. Reason stated for shut-down, is that company's Pittsburgh works have five-months' ore supply on hand; also said there is water shortage in San Miguel River.

Summit County

BROOKS-SNYDER (Breckenridge)—Lessees shipping from narrow, flat vein of high-grade silver ore.

WELLINGTON (Breckenridge)—During 1918, produced 39,295 tons milling-grade ore; 947 tons crude ore, assaying 45.7% zinc, was also shipped. Development work for year consisted of 2365 ft. drifts and 975 ft. raises. New development planned includes opening of Siam and other veins from Oro shaft.

FRENCH LEASING (Montezuma)—Reopening old Philadelphia mine.

LIBERTY M. AND R. (Montezuma)—Developing Pennsylvania mine. Production will be made when snow permits next spring.

Teller County

CRIPPLE CREEK OUTPUT for December was $826,021, increase of $131,057 over November. During month, 87,160 tons of ore was shipped as follows: To Golden Cycle at Colorado Springs, 30,000 tons, having average value of $20; to smelteries at Denver and Pueblo, 2000 tons, average value $55; to Independence mill, 36,200 tons, average value $2.04; to Vindicator Consolidated District mill, 17,960 tons, average value $2.17; and 1000 tons to Big Toad mill, average value $2.20 a ton.

AMERICAN BEAUTY (Cripple Creek)—Leased for two years by Charles E. Schermer, who has option to purchase.

OSTON LEASING (Cripple Creek)—Equipment being installed at Keener tunnel dump, latter to be shipped to Golden Cycle mill at Colorado Springs for treatment. Estimated dump will average $4 a ton.

IDAHO

Boundary County

IDAHO - CONTINENTAL (Porthill) — Recently shipping 25 tons concentrates weekly. Completion of tramway across Kootenay River will permit much larger shipments. About 250 men employed. Property 26 miles from transportation. Grading for narrow-gage road completed.

Shoshone County

NATIONAL COPPER (Mullan)—One unit, or half, of National mill now running full time and handling 300 tons of ore daily. Good ore encountered in crosscut from winze from 1500 level; also new shoot of better ore found on 800 level.

ANCHOR (Murray)—Contract let to drive lower crosscut 700 ft. to intersect vein 200 ft. below present tunnel. Shoot of lead-silver ore 200 ft. long in upper tunnel, much of it shipping grade. Compressor driven by electric power recently installed. Financed by the Days.

MICHIGAN

Copper District

MOHAWK-WOLVERINE SAND SHAFT at Gay mills, to be used in connection with new water supply, sunk 125 ft. Tunnel under Lake Superior advanced about 100 ; will be 2000 ft. long.

CALUMET & HECLA (Calumet)—Copper production in December was 10,539,706 lb. Producers were: Ahmeek, 1,761,823 lb.; Allouez, 543,988; Calumet & Hecla, 5,533,690; Centennial, 195,021; Isle Royale, 1,601,244; La Salle, 130,670; Osceola, 253,-254; Superior, 109,875; and White Pine, 410,141 pounds.

SENECA (Calumet)—Shaft in Kearsarge lode 24 ft. Sinking slowed down on cutting lode by difficulty of removing water with temporary bailers being used. Water thought to be coming from No. 1 Mohawk, as latter shaft has become dry. Sinking now in turned section of shaft, and will be in lode for nearly 100 ft., as angle of shaft is a little steeper than angle of lode, which at this point is 36 degrees.

HANCOCK (Hancock)—Influenza offset increase in working force. Operating only No. 2 shaft.

MINNESOTA

Cuyuna Range

MERRIMAC MINING (Crosby)—This John A. Savage company has taken option for lease on 180 acres near Croft mine, namely, the N½ of SW¼, the S½ of NW¼, and the N½ of SW¼ of SW¼ of Section 1-46-29. Fee owners are A. M. Chisholm and

John G. Williams, of Duluth, and B. McGoffin. of Deerwood, Minn. Tract said to contain large body of iron ore.

ROWE (Riverton)—Deal closed whereby operation of this property, belonging to Pittsburgh Steel and Ore Co., will be taken over by Pickands, Mather & Company.

CLARK (Trommald)—Drop shaft sunk successfully to ledge.

MISSOURI

Joplin District

WARING & WILLIAMS LABORATORIES have purchased E. W. Buskirk's assay laboratories at Joplin, Mo., and Tar River, Okla.; also those of O. K. Engineers Co. at Baxter Springs, Kan., and Picher, Oklahoma.

MONTANA

Silver Bow County

BOSTON & MONTANA DEVELOPMENT (Butte)—W. R. Allen, president, announced sale of $400,000 bond issue on Jan. 17. Railroad will be in operation within few months; rails being laid, work having started Jan. 9. Material ordered for mill.

TUOLUMNE COPPER (Butte)—Development progressing on 800 level of Butte Main Range. Ore shipments appreciating in grade. Preparations completed for deepening shaft.

NEVADA

Esmeralda County

GREAT BEND (Goldfield)—Shipping smelting-grade ore regularly, chiefly from 160 level. Lateral development extended 1100 ft., blocking out milling-grade ore in addition to shipping-grade. Company will remodel mill when tonnage is sufficient.

Humboldt County

NEVADA PACKARD (Rochester)—Judgment given in company's favor in suit against William Keyworth to regain title to valuable real property.

Lander County

COPPER CANYON (Battle Mountain)—Operations stopped until price of copper settled. Many lessees in district have also stopped. Considerable milling-grade ore developed in district.

NICKLAS (Battle Mountain)—Test plant 30 tons' daily capacity completed; if tests are successful, will be used as nucleus of larger plant. Ore mixed sulphides, containing gold, silver, lead, and zinc. Good tonnage developed. Property at Galena, 20 miles southwest. H. B. Menardi in charge of milling experiments.

Lincoln County

PIOCHE DISTRICT ore shipments for week ended Jan. 14 were: Prince Consolidated, 42 cars, and Virginia-Louise, 9 cars.

COMBINED METALS (Pioche)— Operations temporarily reduced, owing to influenza.

PIOCHE MINES (Pioche)—Concentrating and cyanide mill completed, but operation deferred because of shortage of water.

VIRGINIA-LOUISE (Pioche) — High-grade silver-lead ore struck on fourth level. Preparing to raise headframe and enlarge ore bins.

Lyon County

MASON VALLEY MINES (Thompson)—December production of copper was 1,273,176 pounds.

Mineral County

CANDELARIA (Candelaria)—Lucky Hill shipments in second half of December were 203 tons of silver ore, running over 40 oz. Operations begun August, 1918. Will increase January shipments from Argentum and Mount Diablo properties.

WALL STREET COPPER (Luning)—Suspended operations last month, preliminary smelter settlement being insufficient to warrant running under present cost of transportation and treatment. Final settlement doubtful, depending on the future market.

NEVADA RAND (Rand)—William V. Rudderow, general manager, states preparations are being made at property, 17 miles northeast of Walker Lake, for resuming shipments of high-grade silver-gold ore and for further prospecting orebodies. Mine opened to 450 level, and large tonnage of good milling ore developed. William H. Bray, superintendent.

Nye County

MONITOR-BELMONT (Belmont)—Nevada Wonder reopening and retimbering old workings on 200 level. Unwatering through Belmont and Highbridge shafts continuing; expected that 300 level will soon be reached where most early work was done.

CONSOLIDATED MAYFLOWER (Pioneer)—Surface mine plant consists of 90-hp. distillate engine, and 15-drill air compressor. New Denver Rock Drill "Turbo" drills installed throughout mine for drifting. Milling plant to be remodeled and enlarged; plans not yet complete.

CASH BOY (Tonopah)—Crosscut from 1550-ft. point in winze has reached foot wall of vein, exposing considerable mineral.

White Pine County

CONSOLIDATED COPPERMINES (Kimberly)—Morris Brooks mine and Kimberly mill shut down owing to market conditions. Company has large stock of copper on hand. Alpha mine, producing direct-smelting ore, will keep running, producing 700,000 lb. copper monthly. Development program of Alpha to continue, and work on lower levels pushed. Largest continuous orebody opened on 1200 level for length of 350 ft., averaging better than 8% copper; 1300-level crosscut has cut 12% copper ore.

OKLAHOMA

Joplin District

ANNA BEAVER (Tar River)—Address changed as follows on Jan. 1: Mail and express, Tar River, Okla.; freight, Anna Beaver Switch, Tar River, Okla.; telegrams, Picher, Oklahoma.

UTAH

Juab County

CHIEF CONSOLIDATED (Eureka)—Shipping 750 to 1000 tons of ore weekly.

COPPER LEAF (Eureka)—Drifting begun on 1000 level for ore streak continuing from 900. Property about one mile north of Tintic Standard working shaft.

IRON KING (Eureka)—Shaft down 1300 ft. Increasing temperature in bottom regarded as favorable sign. Property near Tintic Standard, where ore opened at depth in connection with warm gases and vapors.

TINTIC DRAIN TUNNEL (Eureka)—In 1800 ft. in harder ground than heretofore. Better progress expected in future.

TINTIC STANDARD (Eureka)—Shipping at rate of 2500 to 3500 tons monthly, most of ore coming from five stopes on 1250 level. Drift from new station on 1350 level continuing in ore to north and east. Shaft down 1475 ft., where station will be cut later. Ore at this property three kinds, dry silver, silver-copper, and silver-lead; some of it very rich.

Salt Lake County

COLUMBUS REXALL (Alta) — First dividend of $14,659 paid Jan 14, after being held up two weeks by temporary restraining order granted Monetaire Mining Co, in litigation with Columbus. Has 500 tons of ore ready for market.

WASHINGTON

Ferry County

QUILP GOLD (Republic) — Resumed after several years' idleness. First car of ore shipped from upper workings. Will work lower levels when unwatered.

Okanogan County

GOLD-SILVER-COPPER DISCOVERY near Nespelem reported by A. A. Kimball, timber cruiser.

Stevens County

UNITED COPPER (Chewelah)—Wages cut as follows: Miners, skip tenders, timber men and hoist men, from $5 a day to $4.25; muckers and motormen, from $4.50 to $3.75; blacksmiths, from $5.50 to $4.75; blacksmith helpers, from $4.50 to $3.75; and mill men and carpenters, from $4.50 to $4. Conrad Wolfle, president, states company worked in 1918 for its men and Government, but will operate this year for benefit of stockholders; only five men left out of 75 employed.

CANADA

British Columbia

CAMP WELCOME CLAIM NO. 1 staked on Columbia River opposite Trail, B. C., by "Sandy" McDonald, an old Caribou placer miner.

CONSOLIDATED M. AND S. OF CANADA directors have decided to extend power development of West Kootenay Power and Light Co. and to increase Trail copper refinery's capacity from 20 tons to 50 tons per day. Capital expenditures for these purposes to total $1,150,000. At Princeton, preparing to accommodate about 150 men preliminary to developing recently acquired Voight claims on Copper Mountain.

INDEPENDENCE AND IMPERIAL CLAIMS on Proserpine Mountain south of Parkerville, B. C., in Caribou district, undergoing development. Apparently two large main veins about 300 ft. apart; continuity proved for about 8000 ft. Outlook said to be promising.

BOWENA COPPER (Bowen Island, Howe Sound)—T. A. Walsh & Co., Vancouver, B. C., erecting 100-ton concentrator.

LANARK (Illecillewaet)—New strike of galena reported in No. 2 tunnel. Several good orebodies blocked out last few months. W. B. Dornberg, president and manager.

SILVER STANDARD (New Hazelton)—Temporarily shut down; 100 tons zinc concentrates and 72 tons lead concentrates on hand; mine in good condition; mill operation has been satisfactory. Shut down because change in freight rates has delayed smelter settlement, not a dollar having been received on shipments made to United States. Has been shipping high-grade lead concentrates to Trail smeltery and silver-zinc concentrates to U. S. Zinc Co., Sand Springs, Oklahoma.

CASSIAR CROWN COPPER (Omineca Division)—Short tunnel run on Ruby claim last summer opened 14 ft. vein with 10 ft. clean ore. I. W. Anderson, Tacoma, Wash., president.

MOUNTAIN CHIEF (Renata)—Gold-silver property bonded to J. W. Evans, of Revelstoke, who plans to build aërial tramway from mine to Arrow Lake. Present output 200 tons ore monthly.

METEOR (Slocan City) — Silver-gold property bonded to J. C. and W. A. Buchanan. Latter will manage mine. Will install compressor. Property recently shipped 22 tons high grade to Trail smeltery.

Manitoba

LULEO (Rice Lake)—Main shaft down 60 ft. Ten-stamp battery and other machinery received, with another 10-stamp battery on the way. Total cost of equipment, including electrical installation, to be about $80,000. Force numbers 29.

Ontario

CULLEN-RENAUD (Boston Creek)—Shaft down 50 ft. on continuation of vein coming from Miller Independence.

KERR LAKE (Cobalt)—December production was 102,289 oz. of silver, against 169,481 oz. in November.

NIPISSING (Cobalt)—New slope 125 ft. in length being started on vein at fourth level near 98 shaft.

KIRKLAND PORPHYRY (Kirkland Lake)—Drift at 400 level opened about 100 ft. showing good-grade ore with free gold in places.

DOME MINES (Porcupine) — General manager C. D. Keading states in report present conditions do not warrant planning immediate resumption of milling. Recommends diamond-drilling campaign be continued, together with drifting west and south on eighth level. About 800,000 tons of ore below present crusher station. Estimated ore reserves 1,950,000 tons.

PLENAURUM (Porcupine) — McIntyre option on this property extended for 12 months.

LAKE SUPERIOR CORP. (Sault Ste. Marie)—Output during last six months of 1918 was: Iron ore, 100,213 tons; coke, 222,428 tons; pig iron, 207,552 tons; and steel ingots, 264,905 tons.

MEXICO

Sonora

CANANEA CONSOLIDATED COPPER (La Cananea)—Working on low-grade treatment problems, but has no plans for further extension at present. Development plans being carried on in same way as during 1918. Company does not purpose to double its operating force, in spite of newspaper reports to the contrary.

PERU

Junin

CERRO DE PASCO (Morococha)—Morococha workmen struck Jan. 13 and rioted before presenting demands. On Jan. 15 power lines dynamited. Mines flooded to Carlos Renaldo tunnel level. Part of Central Railway system tied up. Morococha Prefect powerless to control situation, and upon his advice Americans abandoned camp, turning same over in custody of authorities. This refers to Morococha only. All quiet at Cerro de Pasco and at smeltery. Peruvian cabinet has agreed to eight-hour law throughout country.

BELGIAN CONGO

UNION MINIERE DE HAUT KATANGA (Elisabethville)—December production of copper was 2,513,244 pounds.

The Market Report

SILVER AND STERLING EXCHANGE

Jan.	Sterling Exchange	Silver New York, Cents	Silver London, Pence	Jan.	Sterling Exchange	Silver New York, Cents	Silver London, Pence
16	4.7575	101⅛	48 7/16	20	4.7580	101⅛	48 7/16
17	4.7580	101⅛	48 7/16	21	4.7580	101⅛	48 7/16
18	4.7580	101⅛	48 7/16	22	4.7580	101⅛	48 7/16

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

DAILY PRICES OF METALS IN NEW YORK

Jan.	Copper Electrolytic	Tin Spot.†	Lead N. Y.	Lead St. L.	Zinc St. L.
16	*	67¼	5.35@5.40	5.35@5.40	6¾@7
17	*	67¼	5.30@5.35	5.20@5.30	6¾@6¾
18	*	67½	5.30@5.35	5.20@5.30	6¾@6¾
20	*	67¼	5.35@5.40	5.15@5.20	6.75@6.80
21	*	67½	5.35@5.40	5.15@5.20	6.70@6.75
22	*	67	5.30@5.35	5.15@5.20	6.70@6.75

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis.

* Undetermined.

† For American tin of 99% grade.

LONDON

Jan.	Copper Standard Spot	Copper Standard 3 M.	Copper Electrolytic	Tin Spot	Tin 3 M.	Lead Spot	Lead 3 M.	Zinc Spot
16	90	80	105	250½	245½	40	32½	56
17	92	83	105	250	245½	35	30	56
18	....	....	....	....	....	....	....	....
20	93	83	105	251	247	35	30	56
21	91	84	105	250	245	35	30	56
22	91	84	105	247½	244	35	30	56

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb.

Metal Markets

NEW YORK—Jan. 22, 1919

There was very little business done in any of the markets this week, but such as there was reflected further weakness. Lead is distinctly in the best position of all of the major metals, the lead producers having looked things squarely in the face and having displayed good judgment in their handling of difficult problems.

The British Minister of Munitions gave notice of the following stocks in his possession in Great Britain on Jan. 1, 1919: Copper, 36,000 long tons; spelter, gob, 22,273; spelter, refined, 8017; aluminum, 11,957; soft pig lead, 62,852; nickel, 2096; and antimony, 3508 tons."

According to our own advices, the stock of spelter in France amounts to 45,000 short tons. The French government is refusing all licenses to import metals until the stock in the hands of the government is exhausted.

Copper—The large producers did no business this week. Indeed, we have had no reports of any transactions by producers large or small. The air has been full of vague rumors respecting what consumers would pay or terms that had been offered to them, but these rumors reflect wide variations. There is no doubt that copper has been offered during the week by small producers at 19c., but how much could be obtained at that figure or how much could be placed are both uncertain.

There can be no real market in copper until some one of the large producers, who has plenty of copper to sell, undertakes to make a market. In its initial stages such a market would naturally be convulsive and would, no doubt, go lower temporarily than the economic level. The idea that there would be no substantial buying at any price, under present conditions, is fallacious. Delay has already produced a bad situation, and every day's further delay makes things worse. The markets are going to be righted only by letting nature take its course. There might be a temporary palliative if some large buyer should come in.

When copper buying begins, as it will some day, it is likely to occur first in a demand for wire-bars. The greatest part of the present stocks of refined copper everywhere is in ingots and ingot bars. Conversion of these into other forms would be costly.

Copper Sheets—The base price of copper sheets is 29c. per lb. Copper wire is quoted at 22½@23c. per lb. f.o.b. mill, carload lots. Unchanged.

Tin—Scarcely any business was done. The stock in the hands of the Steel Products Co. hangs over the market like a pall. Efforts are being made to persuade, or compel, consumers to take it over, but many consumers are already provided with their own stocks for a long time to come. There is no business in imported tin, for restrictions of one kind or another still prevent it. The market in American tin shows a little more weakness.

Lead—On the secondary decline a little more business has been done, the sales reported to us this week amounting to about 1500 tons, besides the business ordinarily done on average-price contracts and some arrangements for new business on the same basis. The major part of the business done this week was with consumers, showing that, although some of the latter are well stocked ahead, there are some who need supplies or are willing to anticipate future requirements. The market was more or less irregular, as any developing market at the present time is likely to be. The A. S. & R. Co. on Monday afternoon reduced its price to 5½c., New York, but that was only a step in following the market down. Since then small business has been done in St. Louis as low as 5.15 cents.

London reduced its quotation to £35 for spot on Jan. 17. Apparently, that was to meet the competition of some foreign lead that crept in, with the prospect that more would follow.

Zinc—The crumbling away in this market continued, on small business, from day to day, and on Jan. 21 there were transactions at 6.72½c., with sellers over at that price. The situation in zinc is discussed at length elsewhere in this issue.

Zinc Sheets—Unchanged at $13 per 100 lb.

Other Metals

Aluminum—Ingot aluminum has been sold for 31c. during the last week.

Antimony—But very little business was done. A lot was sold at auction during the week at 7.05c. The markets everywhere are suffering from overproduction, and this market, along with the French and British markets, is overstocked. We quote spot at 7¼@7½c. Futures for February-March shipment from the Orient were offered at 7¼@7⅝ cents.

Bismuth—Metal of the highest purity for pharmaceutical use is quoted at $3.35 per lb. for wholesale lots—500 lb. and over.

Cadmium—Quoted at $1.50 per lb. in lots of 100 to 500 lb.

Nickel—Market quotation: Ingot, 40c.; shot, 43c.; electrolytic, 45c. per pound.

Quicksilver—The market was weak at $105 for California virgin, while Mexican was quoted nominally at $100. San Francisco reported, by telegraph, $105.

Silver and Platinum

Silver—No shipments to London the past week, owing to lack of steamers, and the absence of any fresh items in regard to the movement of silver makes the market quiet but steady. The following extract from a letter of Pixley & Abell to their New York correspondent is of interest:

"It seems to us that for the present the position of India is the crux of the situation. Unable to secure gold, India has to balance her trade by imports of silver. With the poor harvests of this year, the position is not so acute as it would have been, and the future will depend largely upon the yield of her harvests. Still, with peace in sight, the volume of imports into India should grow, and so reduce the amount of silver required.

"When the control of the silver market is relaxed, silver should, in our opinion, rise above the present level. China and the Continent should be good buyers, while the demand for trade purposes all over the world, for medals, and for coinage in many countries which have been starved of silver of late should be good. If prices do rule high when the control is removed, the Indian government will probably find it necessary to again raise the exchange value of the rupee, and this, by tending to restrict exports and to stimulate imports, should in time ease the position by reducing the favorable trade balance."

Mexican dollars at New York: Jan. 16, 77½; Jan. 17, 77½; Jan. 18, 77½; Jan. 20, 77½; Jan. 21, 77½; Jan. 22, 77½.

Platinum—Refined ingot was in fair demand. We quote the market unchanged at $105.

Palladium—Unchanged at $125.

Zinc and Lead Ore Markets

Joplin, Mo., Jan. 18—Blende, per ton, high, $52.55; basis 60% zinc, premium, $50; Class B and Prime Western, $45@42.50; sludge and flotation, $40@37.50; calamine, basis 40% zinc, $35@30. Average selling prices: Blende, $43; calamine, $34.67; all zinc ores, $42.85.

Lead, high, $76.10; basis 80% lead, $75@60; average selling prices, all grades of lead, $60.72 per ton.

Shipments the week: Blende 11,917; calamine, 227; lead, 1691 tons. Value, all ores the week, $623,060.

Every mine that can afford to operate is working to full day capacity. This means that all the larger mines are producing heavily. Many good mines are idle, because they are not rich enough to continue with the present prices for zinc and lead ores.

Platteville, Wis., Jan. 18—Blende, basis 60% zinc, $50 per ton base for premium grades; $45 per ton for high-lead blende.

Lead ore, basis 80% lead, $56@60 per ton.

Shipments reported for the week were 1536 tons blende, 199 tons galena, and no sulphur ore. For the year to date, the totals are 3916 tons blende, 273 tons galena. During the week, 3535 tons of blende was shipped to separating plants.

Other Ores

Tungsten Ore—Conditions were unchanged. No business was reported.

Molybdenum Ore—Further business was done at 75@85c.; but transactions came to a standstill owing to sellers raising their prices, while buyers were unwilling to go any higher.

Pyrites—Spanish pyrites is quoted at 16½c. on the basis of 10s. ocean freight. Restrictions have been removed, but importers must still obtain licenses. Ocean freight is now 25s. per long ton.

Iron Trade Review

PITTSBURGH—Jan. 21

The lapse of a week has not brought fresh market developments of importance, but has served to emphasize the prevailing dullness and bring out still more clearly the necessity of radical changes in fundamental conditions needed to produce a demand for steel at all commensurate with the existing productive capacity.

In finished-steel products there is an extreme dearth of new buying, orders being scattered and amounting usually to no more than a few hundred tons individually, and specifying against contracts involves only moderate tonnages. All the steel taken, either on fresh purchases or against old contracts, is for immediate use, and prompt shipment is insisted upon, the buyer showing strong unwillingness to take any chances against a market decline. Mills are continually asked to guarantee prices against decline to date of shipment. The mills would be relatively safe in doing this, on account of the short time involved, but they refuse, as a matter of principle, to give such a guarantee.

Steel mill outputs are averaging between 60% and 70% of capacity, the rate of production having declined continuously since late in December, and the rate at which new orders and specifications are being received is such as to promise still lighter operations in future, until there is a general change in the situation. A rate of production below 50% of capacity is likely.

The steel trade now realizes more clearly than ever before how dependent it is for its activity upon new construction work, of which there is practically none either in progress or definitely planned. The ordinary every-day activities of the people, even if pursued freely, are entirely insufficient to produce demand equal to one-half the productive capacity.

Prices of unfinished and finished steel products are being held firmly all along the line.

Pig Iron—Last Wednesday a meeting of merchant blast-furnace interests from all over the country was held in Pittsburgh. An effort was made to modify the schedule of price differentials between different descriptions of pig iron, as formulated for Government control, so that there might be a recognized standard, but the discussion developed so many differences of opinion that nothing could be done. There was only one dissenting voice to the opinion expressed that pig iron is marked for considerable declines eventually, though no one would venture a prediction as to when the next decline will occur. It was the general feeling, plainly expressed, that on account of high costs no furnace should pile iron, but should go out of blast in preference, and a number of furnaces are likely to go out. The market is altogether inactive, and shipments against contracts are slightly decreased. We quote: Bessemer, $32.20; basic, $30; No. 2 foundry, $31; malleable, $31.50; forge, $30, f.o.b. Valley furnaces, freight to Pittsburgh being $1.40.

Steel—There is no interest in ordinary soft steel. Quotations are rigidly maintained: Billets, $43.50; sheet bars and small billets, $47; slabs, $46; rods, $57. Large rounds of shell steel in short lengths are being offered by the British government at $24. There is practically no demand for this steel for rolling purposes, as the sizes are inconvenient, and though the material is good for forging, the tonnage demand for that purpose is limited. On the other hand, it is too dear for scrap, as heavy melting steel can be bought at $20 or less. The Government is holding back a large tonnage of steel, awaiting a market with more absorbing power.

Ferromanganese—Makers continue to quote $225, delivered, for 70% ferromanganese, and $65, furnace, for 16% spiegeleisen, but such quotations are not representative of market values, as sales could not be effected even at lower figures.

Coke—The Fuel Administration announced late last week that its control of coke and bituminous coal, as to price and the zone system of distribution, will come to an end Feb. 1. A few days prior to the announcement, Connellsville furnace coke sold at $5.50, or 50c. under the Government limit. Consumers are well covered by contract, so that there is little demand. Some of the contracts provide, in the event of Government control ceasing, that prices for deliveries shall be subject to negotiation, whereas others provide for "last Government price" to control. Some holders of such contracts have already notified producers that they wish to discuss this matter, evidently with the intention of representing that if they have to pay $6 for coke consumed it will be necessary to blow out.

MONTHLY AVERAGE PRICES OF METALS

Silver	New York			London		
	1916	1917	1918	1916	1917	1918
Jan.	56.775	75.630	88.702	26.960	36.682	44.356
Feb.	56.755	77.585	85.716	26.975	37.742	42.792
Mar.	57.935	73.861	88.082	27.597	36.410	43.620
April	64.415	73.875	95.346	30.662	36.963	47.215
May	74.269	74.745	99.505	35.477	37.940	48.980
June	65.024	76.971	99.500	31.060	39.065	48.875
July	62.940	79.010	99.625	30.000	40.110	48.813
Aug.	66.083	85.407	100.292	31.498	43.418	49.077
Sept.	68.515	100.740	101.125	32.584	50.920	49.500
Oct.	67.855	87.332	101.125	32.361	44.324	49.500
Nov.	71.604	85.891	101.125	34.192	43.584	48.969
Dec.	75.765	85.960	101.125	36.410	43.052	48.492
Year	65.661	81.417	96.772	31.315	40.851	47.516

New York quotations cents per ounce troy, 999 fine; London, pence per ounce, sterling silver, 925 fine.

Copper	New York		London			
	Electrolytic		Standard		Electrolytic	
	1917	1918	1917	1918	1917	1918
Jan.	28.673	23.500	131.921	110.000	142.895	125.000
Feb.	31.750	23.500	137.895	110.000	148.100	125.000
Mar.	31.481	23.500	136.750	110.000	151.000	125.000
April	27.935	23.500	133.842	110.000	147.158	125.000
May	28.788	23.500	130.000	110.000	142.000	125.000
June	29.962	23.500	130.000	110.000	142.000	125.000
July	26.620	25.904	128.409	119.913	140.409	134.913
Aug.	25.380	26.000	122.391	122.000	137.000	137.000
Sept.	25.073	26.000	117.500	122.000	135.250	137.000
Oct.	23.500	26.000	110.000	122.000	125.000	137.000
Nov.	23.500	26.000	110.000	122.000	125.000	137.000
Dec.	23.500	(a)	110.000	118.447	125.000	133.167
Year	27.180	24.628	124.892	115.530	138.401	130.507

(a) No Market.

Tin	New York		London	
	1917	1918	1917	1918
January	44.175	85.500	185.813	293.227
February	51.420	92.000	198.974	311.525
March	54.388	(a)	207.443	318.875
April	55.910	(a)	220.171	329.905
May	63.173	(a)	245.114	364.217
June	62.053	(a)	242.083	331.925
July	62.570	(a)	242.181	360.347
August	62.681	(a)	243.978	380.900
September	61.542	(a)	244.038	343.905
October	61.851	(a)	247.467	335.543
November	74.740	(a)	274.943	323.550
December	87.120	(a)	298.556	267.736
Av. year	61.802	88.750	237.563	330.138

(a) No average computed.

Lead	New York		St. Louis		London	
	1917	1918	1917	1918	1917	1918
January	7.626	6.782	7.530	6.684	30.500	29.00
February	8.636	6.973	8.595	6.899	30.500	29.00
March	9.199	7.201	9.120	7.091	30.500	29.00
April	9.288	6.772	9.158	6.701	30.500	29.00
May	10.207	6.818	10.202	6.704	30.500	29.00
June	11.171	7.611	11.123	7.511	30.500	29.00
July	10.710	8.033	10.644	7.750	30.500	29.00
August	10.594	8.050	10.518	7.750	30.500	29.00
September	8.680	8.050	8.611	7.750	30.500	29.00
October	6.710	8.050	6.650	7.750	30.500	29.00
November	6.249	8.050	6.187	7.750	30.500	31.20
December	6.375	6.564	6.312	6.324	30.500	40.00
Year	8.787	7.413	8.721	7.222	30.500	30.10

Spelter	New York		St. Louis		London	
	1917	1918	1917	1918	1917	1918
January	9.619	7.836	9.449	7.661	48.329	54.000
February	10.045	7.814	9.875	7.639	47.000	54.000
March	10.300	7.461	10.130	7.286	47.000	54.000
April	9.459	6.890	9.289	6.715	54.632	54.000
May	9.362	7.314	9.192	7.114	54.000	54.000
June	9.371	8.021	9.201	7.791	54.000	54.000
July	8.643	8.688	8.473	8.338	54.000	54.000
August	8.360	8.985	8.190	8.635	54.000	54.000
September	8.136	9.442	7.966	9.092	54.000	54.000
October	7.983	8.801	7.813	8.451	54.000	54.000
November	7.847	8.491	7.672	8.141	54.000	54.100
December	7.685	8.163	7.510	7.813	54.000	56.050
Year	8.901	8.159	8.813	7.890	52.413	54.180

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Pig Iron, Pgh.	Bessemer‡		Basic‡		No. 2 Foundry	
	1917	1918	1917	1918	1917	1918
January	$35.95	$37.25	$30.95	$33.95	$30.95	$33.95
February	36.37	37.25	30.95	33.95	30.95	33.95
March	37.37	37.25	33.49	33.95	35.91	33.95
April	42.23	36.15	38.90	32.95	40.06	33.95
May	46.94	36.20	42.84	33.00	43.60	34.00
June	54.22	36.36	50.05	33.16	50.14	34.16
July	57.45	36.60	53.80	33.40	53.95	34.40
August	54.17	36.60	50.37	33.40	53.95	34.40
September	46.40	36.60	42.24	33.40	48.58	34.40
October	37.25	36.60	33.95	34.40	33.95	35.40
November	37.25	36.60	33.95	34.40	33.95	35.40
December	37.25	36.60	33.95	34.40	33.95	35.40
Year	$43.57	36.67	$39.62	33.70	$40.83	34.45

‡ As reported by W. P. Snyder & Co.

STOCK QUOTATIONS

N. Y. EXCH.† Jan. 21	
Alaska Gold M.	3½
Alaska Juneau	2
Am.Sm.&Ref.,com.	68
Am.Sm. & Ref., pf.	106
Am.Sm.Sec., pf., A.	91½
Am. Zinc	11½
Am. Zinc, pf.	40
Anaconda	57⅜
Batopilas Min.	1
Bethlehem Steel	55½
Butte & Superior	17⅜
Butte Cop. & Zinc	6
Cerro de Pasco	31½
Chile Cop.	17½
Chino	33½
Colo. Fuel & Iron	35½
Crucible Steel	53½
Crucible Steel, pf.	91
Dome Mines	12
Federal M. & S.	9
Federal M. & S., pf.	33½
Greater Nor., ore ctf	36½
Greene Cananea	43⅜
Gulf States Steel	51
Homestake	94½
Inspiration Con.	43⅜
International Nickel	27
Kennecott	32½
Lackawanna Steel	63
Mexican Petrol.	167½
Miami Copper	24
Nat'l Lead, com.	68½
National Lead, pf.	108
Nev. Consol.	16½
Ontario Min.	6
Ray Con.	20½
Republic I.&S.,com.	72½
Republic I.&S., pf.	100½
Sloss-Sheffield	50
Tennessee C. & C.	13
U. S. Steel, com.	89½
U. S. Steel, pf.	114½
Utah Copper	71½
Va. Iron C. & C.	57

BOSTON CURB* Jan. 21	
Alaska Mines Corp.	‡.12
Boston Ely	.98
Boston & Mont.	.49
Butte & Lon'n Dev.	.14
Calaveras	1⅛
Chief Con.	3½
Contact	.05
Corbin	‡.25
Cortez	.12
Crown Reserve	.44
Crystal Cop.	.20
Eagle & Blue Bell	2½
First Nat. Cop.	1⅛
Houghton Copper	.30
Intermountain	‡.05
Iron Blossom	.45
Iron Cap	15½
Majestic	.22
Mexican Metals	.25
Mines of America	.75
Mojave Tungsten	.05
Nat. Zinc & Lead	.08
Nevada-Douglas	.30
New Baltic	1
New Cornelia	‡16
Oneco	.20
Pacific Mines	‡.35
Rex Cons.	.05
Yukon Gold	.75

SAN FRAN.* Jan. 21	
Alta	.02
Andes	.04
Best & Belcher	.01
Caledonia	.02
Challenge Con.	.03
Confidence	.04
Con. Virginia	.04
Gould & Curry	‡.01
Hale & Norcross	.01
Jacket-Cr. Pt.	‡.06
Mexican	.08
Occidental	.40
Ophir	.01
Overman	.01
Savage	.03
Sierra Nevada	.03
Union Con.	.08
Utah Con.	‡.01
Belmont	2.60
Jim Butler	.33
MacNamara	.28
Midway	.29
Mont.-Tonopah	.14
North Star	.06
Rescue Eula	.07
West End Con.	1.27½
Atlanta	.04
Booth	.13
Comb. Frac.	‡.02
Florence	.12
Jumbo Extension	.13
Kewanas	.06
Nevada Hills	.03
Nevada Packard	.25
Round Mountain	.30
Silver Pick	.04
White Caps	.15

COLO. SPRINGS* Jan. 21	
Cresson Con.	4.93¾
Doctor Jack Pot	.04
Elkton Con.	.14
El Paso	‡.14
Gold Sovereign	‡.02
Golden Cycle	1.76
Granite	.18½
Isabella	.05½
Mary McKinney	.07½
Portland	1.00
United Gold M.	.14½
Vindicator	.41

BOSTON EXCH.† Jan. 21	
Adventure	‡.60
Ahmeek	7
Algomah	‡.30
Alloues	43
Ariz. Com.	11½
Arnold	‡.20
Bingham Mines	19½
Bonanza	‡.10
Butte-Balaklava	‡.21
Calumet & Ariz.	59
Calumet & Hecla	430
Centennial	12½
Copper Range	42
Daly West	2½
Davis-Daly	5
East Butte	9½
Franklin	3¼
Granby	‡79
Hancock	5½
Hedley	‡12
Helvetia	‡.20
Indiana	‡.80
Isle Royale	24½
Keweenaw	‡1
Lake	4
La Salle	2½
Mason Valley	‡2½
Mass	4
Mayflower	2½
Michigan	‡3
Mohawk	51
New Arcadian	1½
New Idria	‡10
North Butte	10½
North Lake	‡.55
Oilway	1½
Old Dominion	34
Osceola	‡52
Quincy	59
St. Mary's M. L.	42
Santa Fe	‡.25
Seneca	13½
Shannon	2½
Shattuck-Ariz.	‡14½
So. Lake	11
So. Utah	‡.10
Superior	4½
Superior & Bost.	2
Trinity	2½
Tuolumne	‡.77
U. S. Smelting	43
U. S. Smelting, pf.	45
Utah Apex	2½
Utah Con.	8
Utah Metal	1½
Victoria	2
Winona	.90
Wolverine	18
Wyandot	‡.50

N. Y. CURB† Jan. 21	
Big Ledge	⅜
Butte & N. Y.	⅜
Butte Detroit	.01½
Caledonia	.31
Calumet & Jerome	.50
Can. Cop. Corpn.	2
Carlisle	⅛
Cashboy	.07
Con. Ariz. Sm.	1⅛
Con. Coppermines	6
Goldfield Con.	.21
Goldfield Merger	.06½
Greenmonster	⅛
Hecla Min.	4⅛
Howe Sound	3½
Jerome Verde	‡.50
Louisiana	⅛
Magma	26
Marsh	.03½
McKinley-Dar-Sa.	‡.47
Milford	‡.75
Mother Lode	.33
Nixon Nevada	.43
Ohio Cop.	⅛
Rawley	‡2½
Ray Hercules	2½
Richmond	‡.56
Rochester Mines	.27
St. Joseph Lead	12
Standard S. L.	⅛
Stewart	‡.16
Success	.05
Tonopah	‡3½
Tonopah Ex.	2½
Tribullion	‡
Troy Arizona	‡.10
United Eastern	4⅛
United Verde Ext.	‡35½
United Zinc	‡1
Utica Mines	‡.08

TORONTO* Jan. 21	
Adanac	.12
Bailey	.04
Beaver Con.	.41
Chambers Feriand.	.08
Coniagas	2.00
Hargraves	.02
Kerr Lake	‡5.37½
La Rose	.31½
Lake Shore	.90
Min. Corp. of Can.	2.00
Nipissing	‡8.75
Peterson Lake	.10
Temiskaming	.31
Wettlaufer-Lor.	.03
Davidson	‡.60
Dome Exten.	.22
Dome Lake	.15
Hollinger	6.12½
McIntyre	1.75
Newray	.12½
Porcu. Crown	.30
Teck-Hughes	.25
Vipond	.22
West Dome	.14

* Bid prices. † Closing prices. ‡ Last quotations.